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Honeywell Process Solutions

Fast Ethernet I/F Module

2MLL-FEnet

User's Guide

ML 200 - FEnet

R200

March 2010

Release 200

Honeywell

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About This Document

This document describes the specifications, handling, and programming methods of Serial Communication I/F module used in association with CPU module of MasterLogic-200 PLC series (referred to as 2MLL-C22A, 2MLL-CH2A, 2MLL-C42A).

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References

The following list identifies all documents that may be source of reference for material discussed in this publication.

Document Title
SoftMaster User's Guide

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Symbol Definitions

The following table lists the symbols used in this document to denote certain conditions.

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user, often in terms of performing a task.
	REFERENCE - EXTERNAL: Identifies an additional source of information outside of the bookset.
	REFERENCE - INTERNAL: Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	<p>CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.</p> <p>CAUTION symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.</p>
	<p>WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death.</p> <p>WARNING symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.</p>
	WARNING, Risk of electrical shock: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.

Symbol	Definition
	ESD HAZARD: Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatically sensitive devices.
	Protective Earth (PE) terminal: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection will be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground: Functional earth connection. NOTE: This connection will be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground: Identifies a connection to the chassis or frame of the equipment, will be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

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1. Introduction

1.1 Introduction to FEnet I/F module

This user's guide describes Fast Ethernet Interface (FEnet I/F) module of MasterLogic-200 series PLC. It is also referred as FEnet I/F module, 100Mbps. Ethernet is a 'technical standard' established by the international organization of Institute of Electrical and Electronic Engineers (IEEE). Carrier Sense Multiple access with Collision Detection (CSMA/CD) method controls communication and establishes network.

This communication mode allows for huge amount of data transfer at high speed. FEnet I/F module is an interface module, which allows data communication between higher-level system such as host PC and PLC, or between PLCs connected with electric or optical media (10/100BASE-TX, 100BASE-FX).

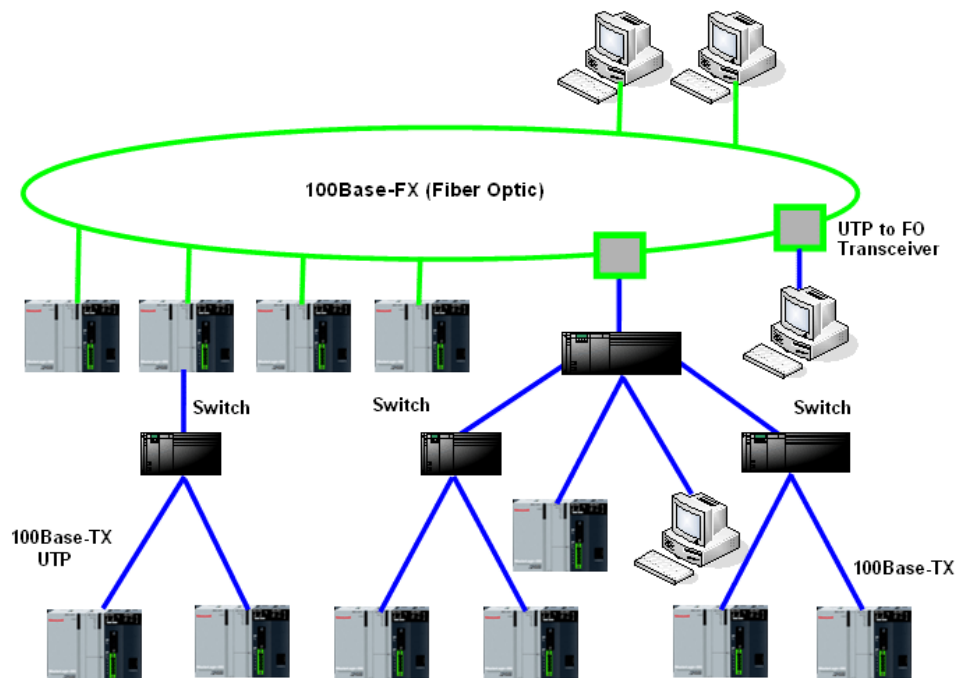


Figure 1 – Configuration diagram of FEnet system

1. Introduction

1.1. Introduction to FEnet I/F module

FEnet I/F module enables a number of communication system configurations.

1. Honeywell proprietary high speed Ethernet communication between MasterLogic-200 PLCs and Experion SCADA host PC (HMI).
2. High speed peer-to-peer (P2P) communication between MasterLogic PLCs.
3. MODBUS TCP master/slave communication with other MODBUS TCP devices.
For example, third-party SCADA host PC (HMI).
4. User-defined protocol communication on Ethernet with other third party proprietary devices supporting TCP/UDP protocols (For example, PLCs).

1.2 Features of FEnet I/F module

MasterLogic-200 FEnet I/F module supports TCP/IP and UDP/IP protocols. The following are the FEnet I/F module features:

1. Module exchange on CPU RUN is possible with a switch M.XCHG on the CPU.
2. Module exchange is possible using module exchange wizard in CPU RUN Mode.
3. It conforms to IEEE 802.3 standard (Ethernet standard supported).
4. High Speed (HS) link service supports communication between Honeywell PLCs at high speed.
5. Supports communication and configuration via SoftMaster-NM.
6. HS link block setting is available to link between modules.
7. Around 128 blocks are setup to send and receive the data (Max. send data: 64blocks x 200 words, max. receive data: 128 blocks x 200 words).
8. In addition to HS link service, communication with 16 Ethernet devices is available (dedicated communication + P2P communication).
9. Supports Loader service (SoftMaster connection) through Ethernet (dedicated TCP/IP PORT: 2002 allotted).
10. It is easy to connect with other brands of Ethernet devices through P2P communication and SoftMaster-NM (variable READ/WRITE service is available through dynamic connection).
11. Supports 10/100BASE-TX, 100BASE-FX media.
12. Module data is accessible via the public network.
13. Supports Honeywell protocol (MasterLogic-200/MasterLogic-100R) and other company's protocol (MODBUS TCP) dedicated service.
14. Supports convenient client function communication between Honeywell PLCs and Ethernet devices of different brands (MasterLogic-200/MasterLogic-100R, Modbus TCP P2P client function).
15. Dynamic IP supports Asymmetric Digital Subscriber Line (ADSL) network.
16. Access table provides host PC, Man Machine Interface (MMI) and communication security.
17. P2P service supports dynamic connection and disconnection.

1. Introduction

1.2. Features of FEnet I/F module

18. Provides various diagnostic functions, status information of modules, and network.
 - a) CPU module status.
 - b) Communication module status.
 - c) Communication service (HS link, dedicated service, P2P) status.
 - d) AutoScan function is used to visualize the information of Honeywell's communication modules connected within the network.
 - e) PING test function is provided to check for existence of other modules.
 - f) Provides type and average amount of packets received by communication module (network load predictable).
 - g) Provides diagnosis function for communication module through the network.
19. Provides E-mail service (ASCII).
20. You can install a maximum of 24 Ethernet communication modules on basic or extension base.

1.3 Product configuration

Designation

Product configuration of MasterLogic-200 FEnet I/F module is shown below:

Table 1 – Configuration of MasterLogic-200

Designations	Description	Media Supported
2MLL-EFMT	10/100BASE-TX	UTP, category 5 or more
2MLL-EFMF	100BASE-FX	Fiber Optic



ATTENTION

MasterLogic-200 series does not support Attachment Unit Interface (AUI) (10BASE-5).



TIP

When Unshielded Twisted Pair (UTP) cable is used, use 100Mbps switching hub. It can be used together with the 10Mbps Ethernet device (category 3 or less) but its baud rate will be limited to 10Mbps.

Available units for installation on each CPU

Based on the CPU type, the following table describes the maximum number of FEnet I/F modules that can be installed. According to the system configuration, install the available and applicable communication modules.

Table 2 – Communication modules

Classification	Number of Communication Modules Available
2MLI-CPUU	24 modules
ML-200R CPUs	24 modules

1. Introduction

1.4. Configuration software

1.4 Configuration software

This section describes the FEnet I/F module and the software used for programming applications that use the Ethernet protocol.

The total number of communication module available on 1 CPU is limited to 24. So, if other types of communication modules like Serial Communication I/F module are installed, then this reduces the number of available Ethernet modules.

Checking software

The following software is needed for programming ML 200 using the FEnet I/F modules:

Table 3 – List of software

Classification		Programming Tool	Frame Setting
2MLL-EFMT	UTP, 10/100BASE-TX	SoftMaster	SoftMaster-NM
2MLL-EFMF	100BASE-FX		



TIP

Use the RS-232C or USB port of CPU module for downloading the program written using SoftMaster and communication configuration done using SoftMaster-NM.



REFERENCE - INTERNAL

Refer to CPU or SoftMaster manual for connection diagram of each cable.

SoftMaster-NM

SoftMaster-NM is an exclusive software used for achieving various configuration tasks:

- Setup parameters edit frames
- Diagnose communication modules and the network of MasterLogic-200 series.

The network diagnosis helps to verify operation status of all the communication modules including FEnet I/F module.



REFERENCE - INTERNAL

For more details, refer to SoftMaster-NM.

The following figure shows the initial window of SoftMaster-NM:

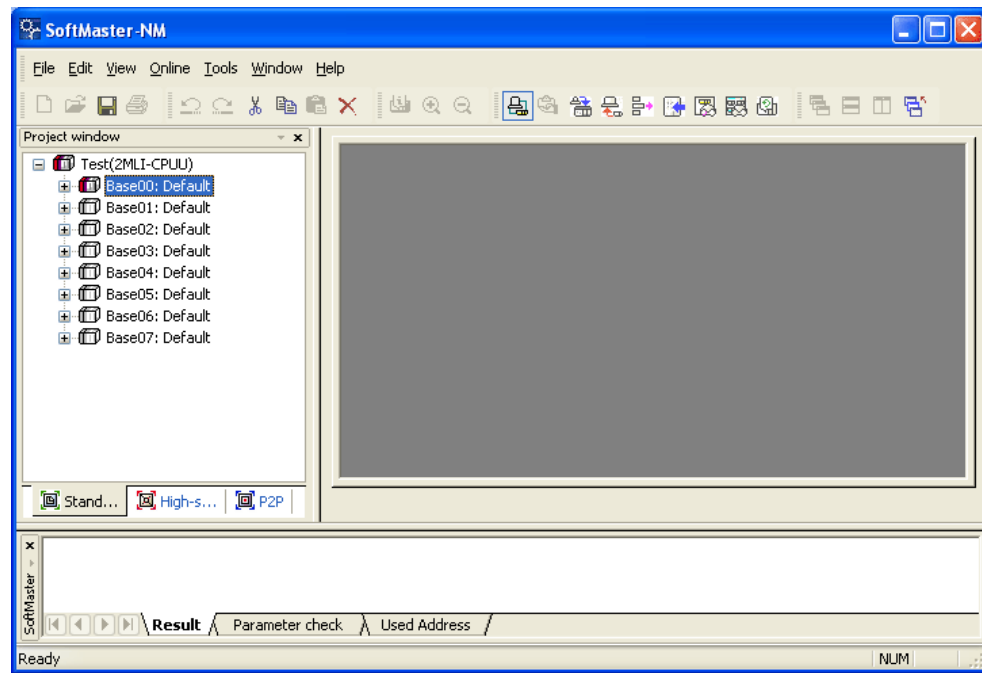


Figure 2 – Initial window of SoftMaster-NM

1. Introduction

1.4. Configuration software

Check the module version

Before using FEnet I/F module, check the version of the requisite module.

1. Using SoftMaster-NM:

Connect with communication module directly to read its information.

If interface status of CPU is normal, proceed using following steps to retrieve the information:

- a) Execute SoftMaster-NM.
- b) Use online connection with CPU.
- c) When connection between SoftMaster-NM and CPU is established, execute '**Diagnosis**' option of SoftMaster-NM.
- d) On the System Diagnosis window, execute 'Communication Module's Status'.
- e) The right-hand side of the communication module's status window displays software information as shown in Figure 3.

The screenshot shows the 'Communication Module Information' window. It is divided into several sections:

- Standard information:** Base #: 0, Slot #: 5, Link type: Snet.
- Link information:** A table with columns 'Station' and 'Select option'. Channel 1: Station 5, Select option RS232. Channel 2: Station 5, Select option RS422.
- Hardware/Software information:** Hardware version: 255.255, Hardware status: Normal, Software version: 1.20.
- Run Mode / Additional information:** A table with columns 'Run mode' and 'Additional info.'. Run mode: P2P, Additional info.: Enable. Below this, it says 'Dedicated service' and 'Modbus ASCII/None'.
- System parameter setup information:** A text area displaying 'Normal'.

At the bottom right, there are 'Refresh' and 'Close' buttons.

Figure 3 – Checking module version through SoftMaster-NM

2. Verify software information against case label of the product.

Product information of the module is printed on the outer case of each communication module. The label is fixed on the back of the product CD , where designation and version information of the product are described. If the printed information does not tally against the SoftMaster-NM information, the module can be removed.

1. Introduction

1.4. Configuration software

2. Product Specifications

2.1 Performance specifications

The following table provides the specifications for system configuration using the FE-net I/F module.

Table 4 – Performance specification of FEnet I/F module

Item		Product Name	
		2MLL-EFMT (10/100BASE-TX)	2MLL-EFMF (100BASE-FX)
Transmission specification	Baud rate	10/100Mbps	100Mbps
	Transmission type	Base band	
	Max. extended length between nodes	100m (Node-hub)	2km
	Max. segment length	-	-
	Max. number of nodes	Hub connection (Up to 9 recommended)	30/Segment
	Distance between nodes	-	Integral times of 0.5m
	Max. protocol size	1500 Byte	
	Access method to service zone	CSMA/CD	
	Frame error check	CRC 16 = $X^{15} + X^{14} + X^{13} + \dots + X^2 + X + 1$	

2. Product Specifications

2.1. Performance specifications

Item		Product Name	
		2MLL-EFMT (10/100BASE-TX)	2MLL-EFMF (100BASE-FX)
Basic specification	Current consumption (5V)	2MLL-EFMT: 410mA 2MLL-EFMF: 630mA	
	Weight	2MLL-EFMT: 105g 2MLL-EFMF: 120g	

2.2 Part names and functions

The FE-net I/F module structure with the LED display and media interface locations is as shown below.

Structure of FEnet I/F module

1. 2MLL-EFMT/2MLL-EFMF

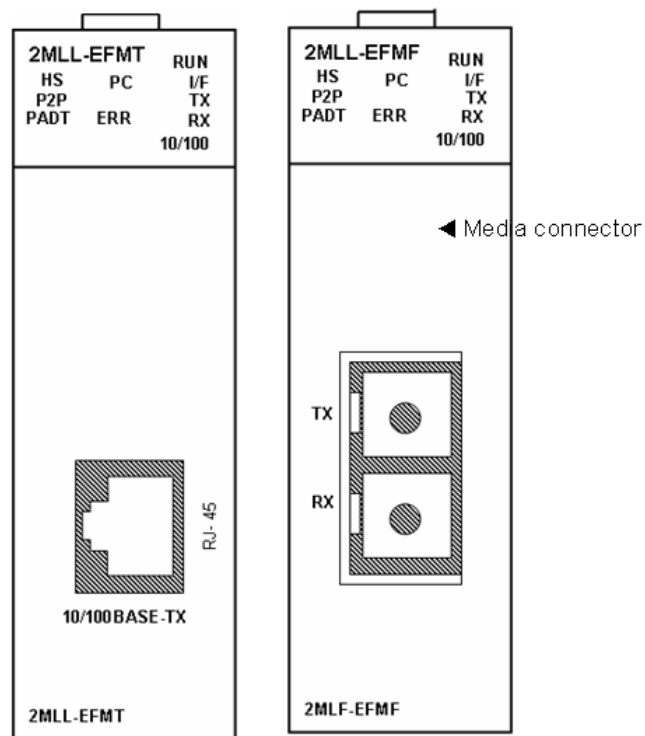


Figure 4 – FEnet I/F module

2. Product Specifications

2.2. Part names and functions

Table 5 describes the details of LED display. Refer to [Troubleshooting](#) for troubleshooting problems based on the status of the LEDs.

Table 5 – LEDs of FEnet I/F module

LED Name	LED Status	Details	Remedy Action
RUN	ON	Normal	
	OFF	Serious defect	Contact A/S center
I/F	Blinks	Normal	
	OFF, ON	Serious defect	Contact A/S center
HS	ON	HS link service active	
	OFF	HS link service Off	Check SoftMaster-NM setting
P2P	ON	P2P service active	
	OFF	P2P service Off	Check SoftMaster-NM setting
PADT	ON	Remote-connected	
	OFF	Remote-disconnected	Check SoftMaster setting
PC	ON	Dedicated communication service active	
	OFF	Dedicated communication service Off	Check MMI(HMI) setting
ERR	ON	Serious defect	Contact A/S center
	OFF	Normal	
TX	ON	Data is being transmitted	
	OFF	Serious defect	Contact A/S center

2. Product Specifications

2.2. Part names and functions

LED Name	LED Status	Details	Remedy Action
RX	ON	Data is being received	
	OFF	Serious defect	Contact A/S center
10/100	ON	100Mbps	
	OFF	10Mbps	Check media

2. Product Specifications

2.3. Cable specifications

2.3 Cable specifications

The following section describes the different types of cables used as media and their specifications.

UTP cable

UTP cable is classified based on two criteria:

1. Shielding used: It is classified into three types (UTP, FTP, STP)
2. Transmission frequency band used: It is classified into seven types (Cat.1–7)

Table 6 – Types of cables

Classification	Details	Purpose
UTP (or U.UTP)	Unshielded cable. High-speed data transmission.	Max. 200MHz Phonetic + Data + Low grade video signal
FTP (or S.UTP)	Shielded cable core only.	Max.100MHz electronic impediment (EMI) and electric stability considered Phonetic + Data + Low grade video signal
STP (or S.STP)	Double-shielded cable. Shielded core as well as shielded individual cable pair	Max. 500MHz Phonetic + Data + Video signal. Used as a substitute for 75 Ω coaxial cable

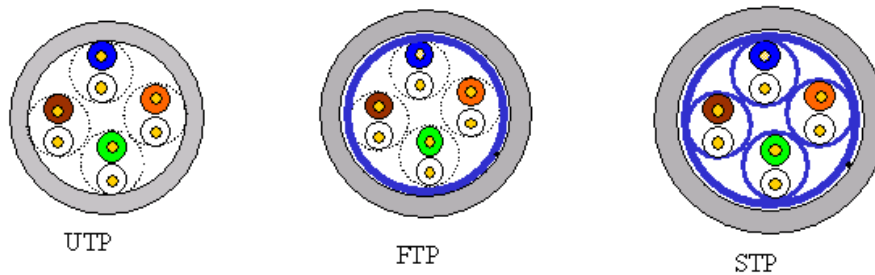


Figure 5 – Cable cross sections



ATTENTION

- UTP: Unshielded Twisted Pair Copper Cable
- FTP: (Overall) Foiled Twisted Pair Copper Cable
- STP: (Overall) Shielded (and Shielded Individual Pair) Twisted Pair Copper Cable
- Patch Cable (or Patch Cord).

Conductor composed of stranded cable can be used to increase the flexibility of UTP 4-pair cable instead of solid conductor. Surface specification and materials used is un-coated AWG 24 (7/0203A).

The diameter of a single cable is 0.203mm, and is of 1+6 structure as standardized with normalized copper cable.

Table 7 – Classification based on frequency used

Classification	Frequency Used (MHz)	Transmission Speed (Mbps)	Usage
Category 1	Phonetic frequency	1	Phone network (2-Pair)
Category 2	4	4	Multi-pair communication cable
Category 3	16	16	Phone network + computer network
Category 4	20	20	Computer network transmission low-loss communication cable
Category 5 and Enhanced Category 5	100	100	Digital phone network + computer network low-loss, broadband cable



ATTENTION

Items are classified as Category 3, Category 5, and Category 6. Category 5 has replaced Category 4, and Category 7 for STP structure is being used for development all over the world.

2. Product Specifications

2.3. Cable specifications

Table 8 – Electrical specifications of Category 5 twisted pair cable (UTP)

Item	Unit		Value
Conductor resistance (Max)	Ω/km		93.5
Isolation resistance (Min)	$\text{M}\Omega \text{ km}$		2500
Voltage endurance	V/min		AC 500
Characteristic impedance	$\Omega (1\text{--}100\text{MHz})$		100 ± 15
Attenuation	$\text{dB}/100\text{m}$ or less	10MHz	6.5
		16MHz	8.2
		20MHz	9.3
Near-end cross talk attenuation	$\text{dB}/100\text{m}$ or less	10MHz	47
		16MHz	44
		20MHz	42

Optical cable

Table 9 – Optical cable specifications

Item	Value
Cable type	Twin strands of multi-mode fiber optic cable (MMF)
Connector	SC type connector
Diameter of optical fiber	62.5/125µm (62.5µm fiber optic core and 125µm outer cladding)
Wavelength used	1350nm
Attenuation	2dB/1000m or less
Near-end cross talk Attenuation	11dB or less



TIP

- Requisite professional advice is required before installation, since the usage of cable for communication module differs from each other,
 - The optical cable can have communication errors due to attenuation, if there are any fingerprints or external materials stuck on the sectional end of the cable during its treatment.
-

2. Product Specifications

2.3. Cable specifications

3. Installation and Operation

3.1 Precautions for installation

Installing FEnet I/F module

This product is highly reliable regardless of the installation environment. However, it is recommended to take following precautions to ensure reliability and stability of the system.

1. Verify the basic factors necessary for system configuration and then select an appropriate communication module.
2. Choose only one cable between 10/100BASE-TX and 100BASE-FX for the communication module.
3. Ensure that there is no external material on the base connector as well as module connector. Verify that there is no damage to the connector pin of the module before installation.
4. All types of communication modules can be installed on the extension base. However, it is recommended to install communication modules on the slot close to CPU.
5. For installation of the module, insert the bulgy part exactly at the bottom of the module into the base groove. Ensure that the communication cable is disconnected when doing so. Apply enough strength until its top is locked up with the locking device of the base. If the locking does not happen, it can cause an error on the interface of the CPU.
6. Select standard products for the switching hub and the communication cable, which are necessary for communication with FEnet I/F module.

3. Installation and Operation

3.1. Precautions for installation

Installation to operation

The actions necessary to bring the FEnet I/F module to operational state are detailed below. Once the product installation is complete, install and configure the system as specified in the following steps:

1. Install FEnet I/F module on the base.
2. Connect FEnet I/F module with other network.
3. Turn the system power **ON**.
4. Run SoftMaster-NM to setup basic parameters.
5. Reset the module after the basic parameters are downloaded.
6. Check whether RUN and I/F RUN LEDs of the module are normal.
7. If LED status and CPU are normal, check the status information of the communication module and CPU with the diagnosis function of SoftMaster-NM.
8. If the module status is normal, check for response from the module when PING test is executed through a computer connected to the network. If no computer is connected to the network, use the Live Check option among diagnosis services of SoftMaster-NM to check the response.
9. Setup the communication services and download the setup items to the PLC with SoftMaster-NM.
10. Enable communication service.
11. After programming with SoftMaster, write it on the CPU to start the operation.



TIP

Reset the applicable module, when station number and IP address is specified through SoftMaster-NM. The earlier station number and the IP address (including frames) are stored for reference when the communication module is started again. Any changes done during communication will not be applied during Run.

3.2 Installing product

The process to connect the FEnet I/F module to the rest of the network is shown in the figure below.

The twisted pair cable is connected between the RJ-45 interface on the module and a port on the switching Hub.

Installing 10/100BASE-TX

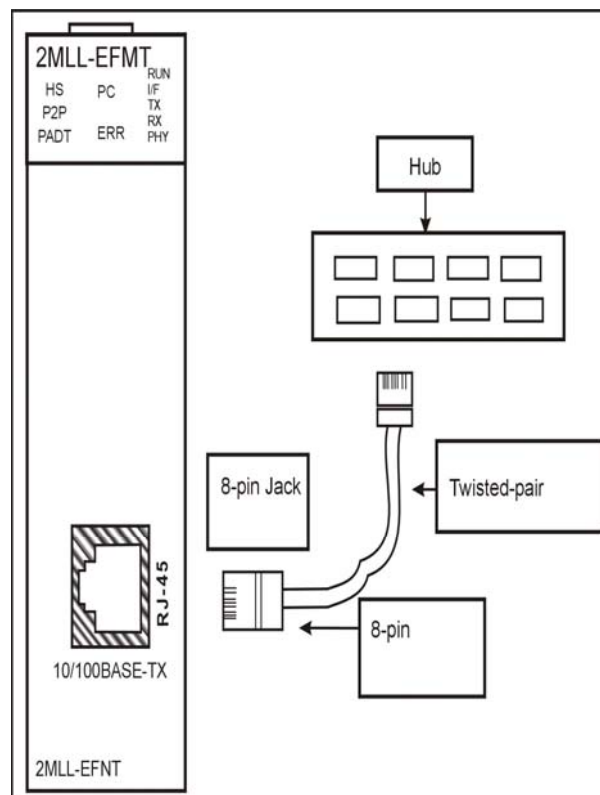


Figure 6 – Installing 10/100BASE-TX

3. Installation and Operation

3.2. Installing product

The maximum cable length (distance between a module and the hub) of a segment in 10/100BASE-TX system is 100m. Generally, the connection to the hub consists of a straight cable with TD and RD stranded inside. The cross cable is used only when two communication modules are connected 1 to 1.

Table 10 – Cable connector details

Pin Number	Sign	Straight Cable between Hub and Module	1 to 1 Cross-cable
1	TD+	1 – 1	1 – 3
2	TD-	2 – 2	2 – 6
3	RD+	3 – 3	3 – 1
6	RD-	6 – 6	6 – 2
4, 5, 7, 8	Not used		



TIP

- The structure of 10/100BASE-TX cable is vulnerable to external noise.
- The twisted cable can withstand noise pollution.
- The cables connected to pin number 1 and 2 (TD+ and TD-) should be twisted with cables connected to pin number 3 and 6 (RD+ and RD-).
- Hub power will be separated from PLC power to reduce the noise interference.

Precautions for UTP installation

1. In order to transmit reliably at 100Mbps with a UTP cable, use the cable conforming to the characteristics of Category 5.
2. Do not exceed the tension strength of the cable intensely during wiring.
3. Jumper wire and patch cord should be applied loosely. The characteristics of Category 5 may deteriorate if it is wired too tight.
4. When UTP cable is installed, a suitable distance should be maintained between EMI source and the UTP cable.

3. Installation and Operation

3.2. Installing product

Table 11 – Minimum separation distance to be maintained

Condition	Min. Separation Distance		
	2.0KVA or less	2.5 KVA	5.0KVA or more
Power line unshielded, or electric facility open or near to nonmetallic pipe	127mm	305mm	610mm
Power line unshielded, or electric facility near to metallic pipe buried	64mm	152mm	305mm
Power line inside metallic pipe buried (or equivalently shielded) near to metallic pipe buried	-	76mm	152mm
Transformer, electric motor, fluorescent lamp	1016mm 305mm		



TIP

If voltage is 480V, rated power is 5KVA or more.

3. Installation and Operation

3.2. Installing product

Installation of 100BASE-FX

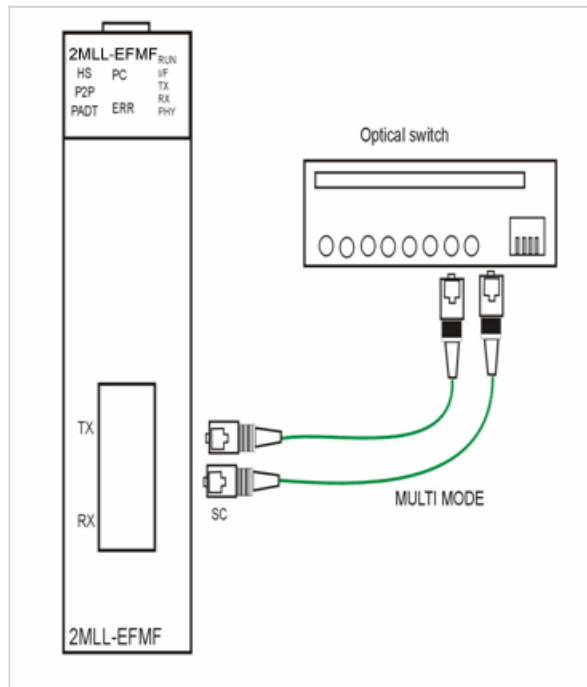


Figure 7 – Installation of 100BASE-FX

The maximum cable length of segment in 100BASE-FX system is 2km. Let the module's Tx cross-connect with the optical switch's Rx, and the module's Rx with the optical switch's Tx.



ATTENTION

- The optical cable requires proper attention during its treatment, as it is vulnerable to pressure, folding and pulling.
 - The optical contact between the connector and the end of the cable can have communication errors if contaminated, which may result in loss of communication.
 - If the cable is installed outdoors, additional counter measures are required to protect the cable.
-

3.3 Operation

Check the LED status of FEnet I/F module after connecting the communication cable and turning on the power. If the status is normal, download the requisite program to PLC through SoftMaster.

Precautions for system configuration

1. IP addresses should be different for each device in one network system including FEnet I/F module. If there are more than one device assigned with same IP address in one network system, communication error can occur. HS link station number of all stations also will be different for each FEnet I/F module to use HS link service.
2. If the communication cable used is not as per the standard specification, serious errors in communication can occur.
3. Before installation, check whether the communication cable is open or short.
4. Tighten up the communication cable connector. If cable connection is unstable, it can lead to intermittent communication errors.
5. If the length of the cable is long, keep the cable far away from power line or inductive noise.
6. Since the flexibility of coaxial cable is low, it should be diverged, minimum 30cm away from the connector in the communication module. If the cable is bent at right angle or transformed compulsorily, it may cause cable disconnection or connector damage in the communication module.
7. If the LED status is abnormal after power is turned ON, refer to [Troubleshooting](#) for available action against the LED status. Contact A/S center for further help.

Checklist before start of operation

The items you need to check before operation start of the FEnet I/F module are described below.

1. Communication module installed on PLC

Table 12 – Check list details

Check items	Description
Installation and inspection of basic software	Is installation and operation of SoftMaster normal?
	Is installation and operation of SoftMaster-NM normal?

3. Installation and Operation

3.3. Operation

Check items	Description
Communication cable connection (if cable is connected)	Is connection and tab status of communication cable normal? Is the status of LED and cable connection normal?
Module installation	Is the FEnet I/F module installed correctly on base?

2. Steps of operation

The steps for the test operation of an installed PLC are described below.

Step	Action
1	Power On: <ul style="list-style-type: none">• Confirm if input power is present.• Check the communication cable connection.• Turn the Power ON.• Check if power LED of power module is turned ON.• Check LED status of CPU module.• If the LED status is abnormal, refer to Troubleshooting of each PLC model.• Check the LED status of communication module. If the status is normal proceed to Step 8.• Set system parameters correctly for download.
2	Programming: Write the execution program with SoftMaster and write to CPU module.
3	Sequence check: Confirm the operation of communication module according to program.
4	Program modification: Modify the program, if module operation is abnormal in the sequence program.
5	Program preservation: <ul style="list-style-type: none">• Save the program onto floppy or hard disk.• Print circuit drawings and list.• Save the program to the memory module when it is necessary.

Installing or removing the module

Follow the steps described below to replace the requisite module due to its hardware error or system change.

To replace the communication module:

1. Switch off power to the base, where the communication module is installed.
2. Disconnect the network cable.
3. Install a new module as specified in the steps of 'Checklist before operation' in [Table 12](#).



TIP

- Reset the device at the other end (MMI or PC), when FEnet I/F module is replaced.
 - The device may stop communicating due to the time-out of the requisite module.
-

3. Installation and Operation

3.3. Operation

4. SoftMaster-NM Program

4.1 Introduction

SoftMaster-NM (a dedicated software for communication modules) is used to setup parameters of communication modules such as FEnet, Snet, DeviceNet and Profibus-DP including FEnet I/F module. It is also used for managing and diagnosing communication modules.

A basic program tool is required to setup, control and manage the network using Ethernet communication. SoftMaster-NM is used to setup and manage all the communication parameters including system parameters, service parameters, and module and network diagnostics as well.

With respect to Ethernet network, the functions of SoftMaster-NM are classified into the following:

1. Basic parameters setting of communication system.
2. Parameters setting of communication service (HS link, P2P, dedicated service).
3. Diagnosis service for module and network.

Parameters and files specified by the user can be downloaded and uploaded from Ethernet communication module. Since CPU manages the module with downloaded communication system parameters, they can be directly used without resetting, even if a new communication module is installed on the initially specified position.

This chapter focuses on the description of necessary settings for the application of Ethernet module.

4. SoftMaster-NM Program

4.2. Basic settings

4.2 Basic settings

This section describes the basic parameter settings like module registration, I/O parameters, and TCP/IP settings using SoftMaster-NM.

Registering of communication module

Select the PLC type to establish connection between SoftMaster-NM and PLC.

From **Tool** menu, select **Network Manager** on SoftMaster to execute SoftMaster-NM. The system displays the initial window of SoftMaster-NM as shown in [Figure 8](#).

Execution of SoftMaster-NM

When SoftMaster-NM is executed for the first time, the following window displays. The communication module must be registered on the requisite base and slot positions, to setup basic parameters. The registration can be done during online or offline status.

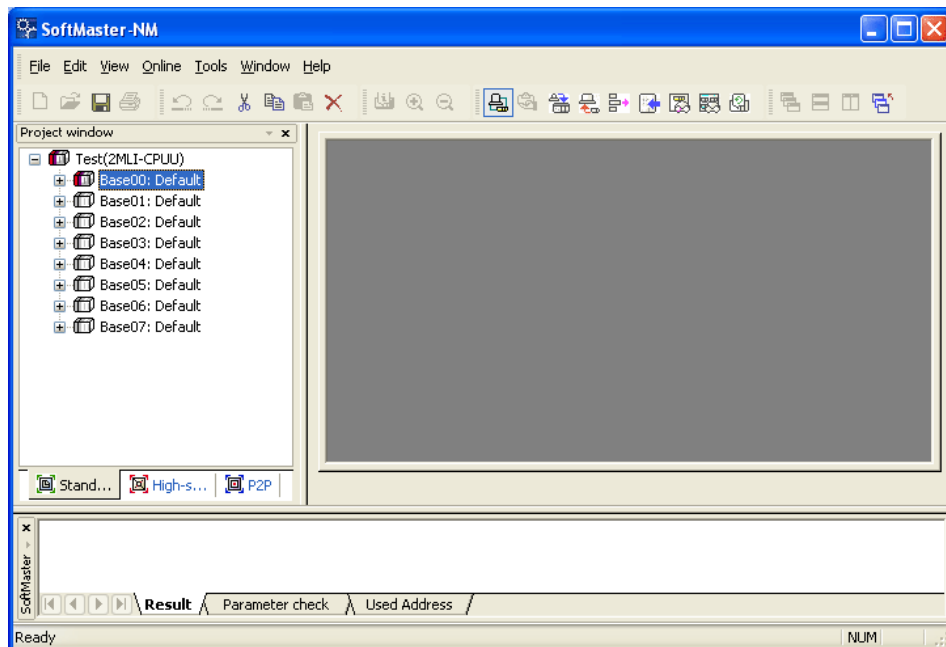


Figure 8 – Initial window of SoftMaster-NM

1. Registering off-line status

Perform the following steps for registering offline status.

Step	Action
1	In order to register the communication module without necessarily establishing connection between SoftMaster-NM and PLC, select the requisite positions of base and slot on the Module Settings window of SoftMaster-NM.
2	If FENet is to be registered on base 0 and slot 2, select the applicable positions on the Module Settings window to display the Communication Module Settings window.
3	Select the communication module (FENet) and click OK .

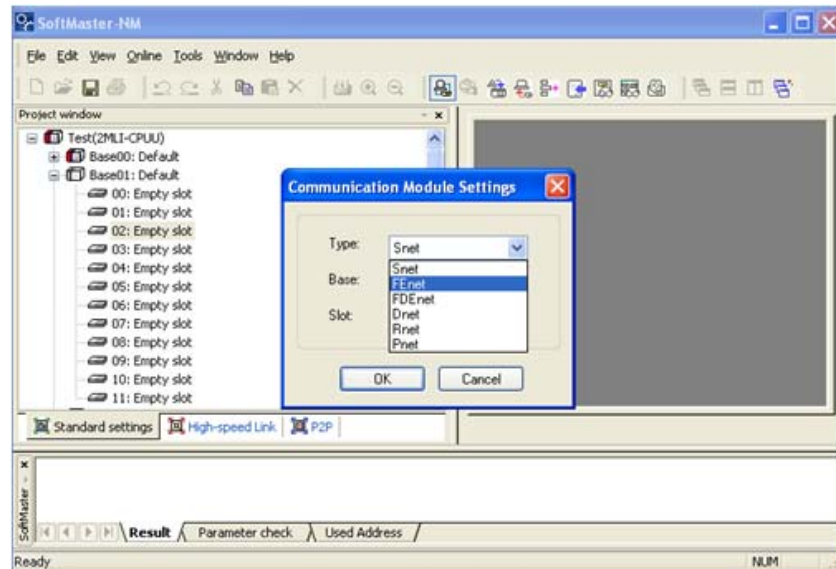


Figure 9 – Module settings

4 FENet module registered on Slot 2 of Base 0 is as shown below:

4. SoftMaster-NM Program

4.2. Basic settings

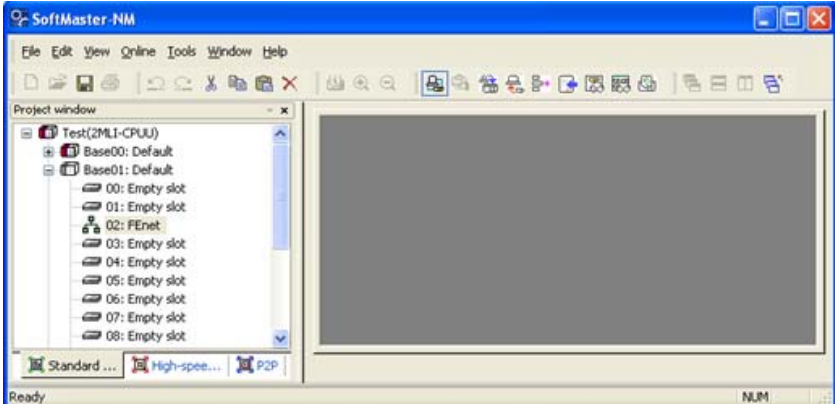
Step	Action
	

Figure 10 – Module registered

2. Registering online status.

Perform the following steps for registering online status.

Step	Action
1	Connect SoftMaster-NM and PLC on which the communication module is installed.

Step	Action
2	After connection is complete, from Online menu, select Read IO Information to search for all the communication modules installed on the applicable PLC to register.

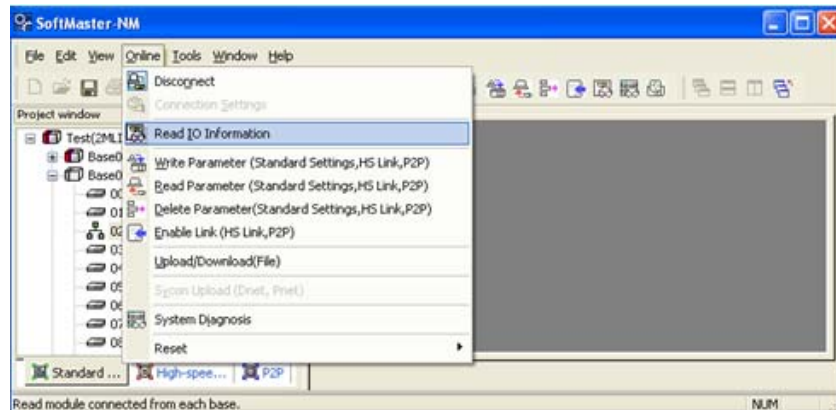


Figure 11 – Read IO information

- 3 If FEnet is installed on Slot 2 of Base 0, applicable communication module will be automatically searched and registered as shown below:

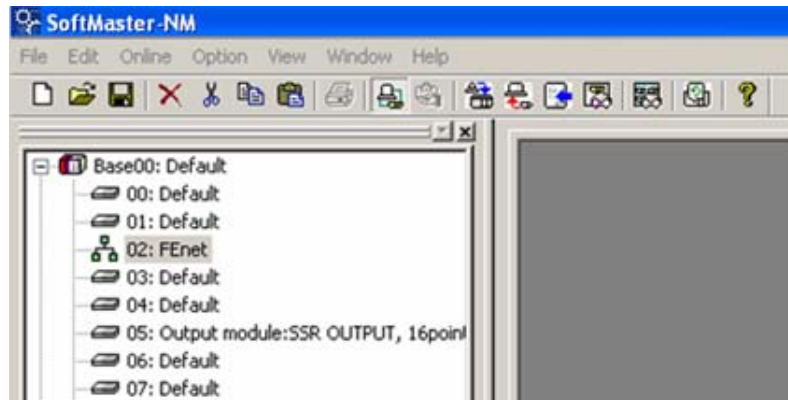


Figure 12 – Standard settings window

- 4 If it is not identical to the module information registered in off-line status or in the previous project, the following message appears, prompting to update.

4. SoftMaster-NM Program

4.2. Basic settings

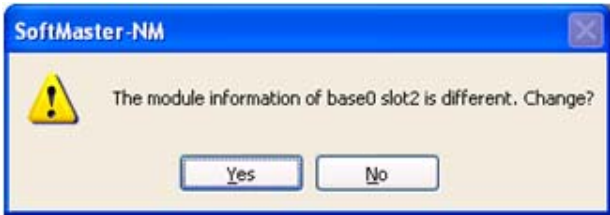
Step	Action
	 A screenshot of a Windows-style message box titled "SoftMaster-NM". It features a yellow warning triangle icon on the left. The text inside the box reads: "The module information of base0 slot2 is different. Change?". At the bottom, there are two buttons: "Yes" and "No".

Figure 13 – Message window of IO changed

-
- | | |
|---|--|
| 5 | Click Yes to update the registration details. |
|---|--|
-

Standard settings (Module)

Standard settings specify communication system parameters necessary to control and manage the Ethernet network. It decides basic items such as FEnet I/F module's IP address, subnet mask, gateway address, DNS server, reception response time, number of dedicated connections, host table settings, and so on.

Set basic parameters on the standard settings window of the module window to download the Ethernet communication parameters. The following figure shows specified basic parameter settings:

The image shows a 'Standard Settings' dialog box with three main sections:

- TCP/IP settings:**
 - HS link Station #: 10
 - Media: AUTO(TP/CAT5) (dropdown)
 - IP address: 165 . 244 . 149 . 230
 - Subnet mask: 255 . 255 . 255 . 0
 - Gateway: 0 . 0 . 0 . 1
 - DNS server: 0 . 0 . 0 . 1
 - ☐ DHCP
 - Reception waiting time: 8 sec [1 - 255]
 - # of Dedicated Connections: 3 (1 - 16)
- Host table settings:**
 - ☐ Enable host table
 - Table with 2 columns: Index, IP address. Row 1: 1, 165.244.149.58
- Driver(server) settings:**
 - Driver: MLDP server (dropdown)
 - Modbus Settings button

Buttons: OK, Cancel

Figure 14 – Standard settings

The following table describes the TCP/IP settings.

Table 13 – TCP/IP settings

Classification	Description
HS link station number	Specify station number for HS link communication between Honeywell PLC's FEnet I/F modules. This number should not be identical to the other communication module.
Media	Select media to use. <ul style="list-style-type: none"> AUTO (electric): Automatically detects the media currently installed. 0M/HALF: 10MBps Half Duplex electric 10M/FULL: 10MBps Full Duplex electric

4. SoftMaster-NM Program

4.2. Basic settings

Classification	Description
	<ul style="list-style-type: none">• 100M/HALF: 100MBps Half Duplex electric• 100M/FULL: 100MBps Full Duplex electric• FX/100M/HALF: 100MBps Half Duplex optical• FX/100M/FULL: 100MBps Full Duplex optical
IP address	Specifies the IP Address of the requisite FEnet I/F module.
Subnet mask	Necessary value to verify if destination station is on the same network of the requisite station.
Gateway	IP address of the gateway or router to transmit/receive data through the public network or a different network from where the requisite FEnet module is installed.
DNS server	Specifies the IP address of domain name server.
DHCP	Select DHCP option when IP address is not fixed but assigned as a dynamic IP. The dynamic IP is used for ADSL communication.
Reception latency time	If there is no request during the specified time from the host PC or MMI connected for dedicated communication, it ends the dedicated service connection regardless of normal ending procedures. This time is used in dedicated service to reset the channel when any error occurs on the destination station or the cable is disconnected.
Number of dedicated connections	Maximum number of TCP dedicated services (1–16) accessible at a time.

Table 14 – Driver (server) setting

Classification	Description
MLDP server	Set as dedicated communication server (slave) while in operation.
Modbus TCP/IP server (slave)	Set as Modbus server driver (slave) while in operation.

Table 15 – Host table setting

Classification	Description
Enable host table	When this option is enabled, only those client addresses registered in the host table are allowed to communicate on the network.

4.3 HS link setting

This section describes the communication settings, HS Link Block settings, and so on.

Setting of HS link parameters

Setting HS link communication of FEnet I/F module is described below:

Step	Action
1	Select High-speed link tab on the SoftMaster-NM.

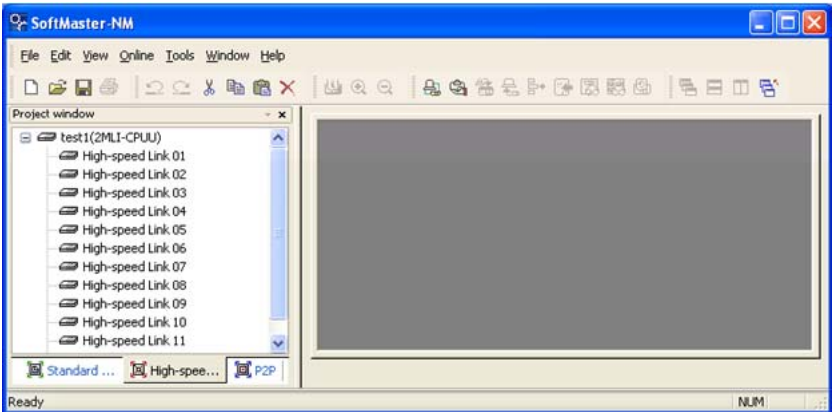


Figure 15 – High-speed link window

2	Select the communication module and double-click High-speed link The following window displays.
---	---

4. SoftMaster-NM Program

4.3. HS link setting

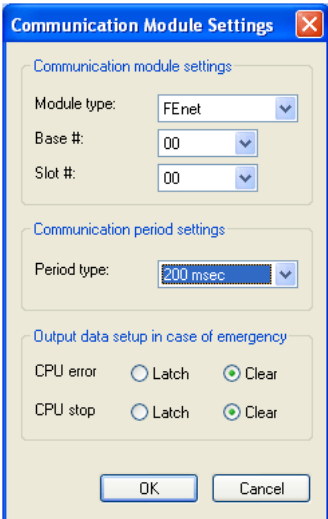
Step	Action
	

Figure 16 – Setting of communication module and communication period

The following table describes the communication settings.

Table 16 – Communication settings

Classification		Description
Communication module settings	Module type	Select FEnet.
	Base number	Select base number on which the module is installed.
	Slot number	Select slot number on which the module is installed.
Communication period settings	Period type	Set the data transmission period (available range is 20ms–10s).

- Click **OK** in the **Communication Module Settings** window. The following window displays.

Step	Action
------	--------

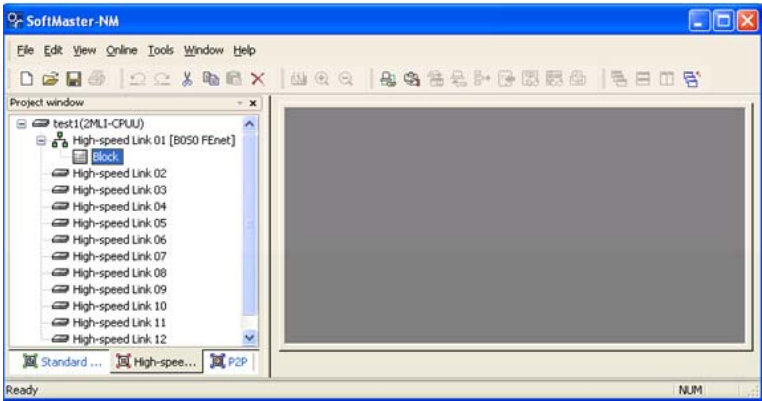


Figure 17 – Communication module settings

- 4 Double-click High-speed link to do the High-speed link parameters settings.

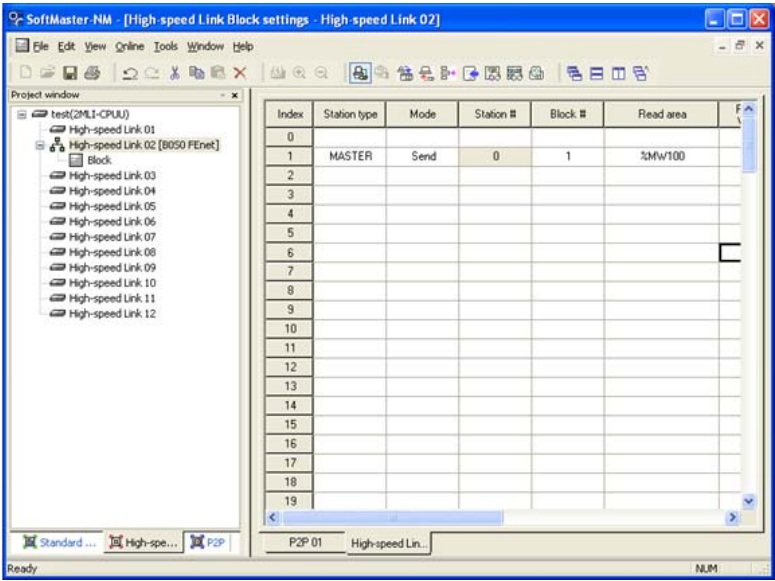


Figure 18 – High-speed link block settings

The following table describes the block settings.

4. SoftMaster-NM Program

4.3. HS link setting

Step	Action
------	--------

Table 17 – Block settings

Classification		Description
Station type	Master	Specify Master or Slave for FEnet
	Slave	
Station number	Native station number	This module is used to transmit and the other module is used to receive.
Block type	Transmit	Transmits data
	Receive	Receives data
Block number	Block number	Specify Tx Block and Rx Block
Read area	Address	Memory area of this module
	Size (Word)	Specify data size to transmit
Save area	Address	Area to save data received from the destination station.
	Size (Word)	Specify data size to receive



ATTENTION

Ensure that the address range configured for HS link is within the synchronization address range in redundancy parameter.

- From **Online** menu, select **Write Parameter** and **Online-Write Parameters** window displays. Check the applicable HS link on the **HS link Online-Write Parameters** window and click **Confirm**.
- Perform the following, to read HS link parameters..
 - Connect with CPU.
 - After connection is established, select **Read Parameter** in **Online** menu. Check requisite parameters and then click **Confirm** to read standard settings and HS link parameters specified.

4.4 P2P setting

This section describes the P2P parameter settings for the FEnet I/F module.

P2P parameters

P2P setting of FEnet I/F module is described below:

Step	Action
1	Select P2P Parameters tab (click P2P on SoftMaster-NM) to display the window as shown in the following figure.

2	Based on the number of FEnet I/F modules installed, a maximum of eight parameters are available for P2P setting.
3	Standard settings of communication module. Double-click P2P parameters and the Communication Module Setting window displays as shown in Figure 20 .

Figure 19 – Initial window of P2P settings

4. SoftMaster-NM Program

4.4. P2P setting

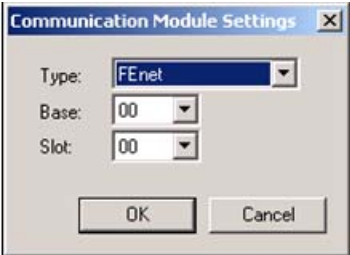
Step	Action
	

Figure 20 – Selection of communication module

- 4 Select **FEnet** and then specify **Base** number and **Slot** number where the module is installed.
- 5 After communication module setting is completed, click **OK** and P2P setting details window displays as shown in [Figure 21](#).

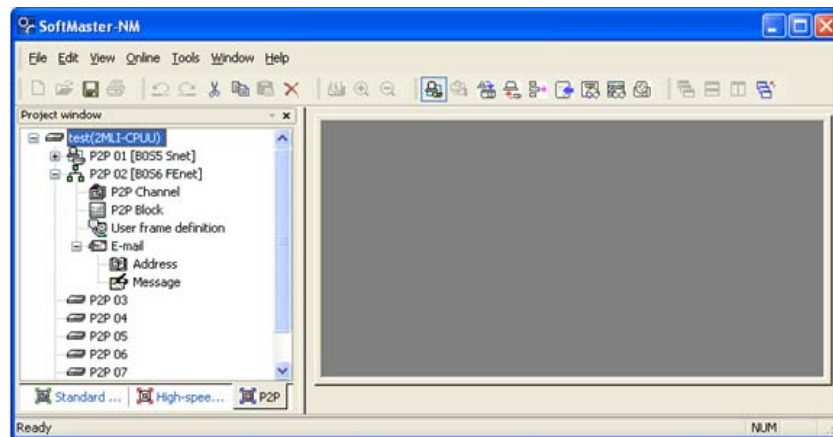


Figure 21 – P2P setting details



REFERENCE – INTERNAL

For more details on setting information, refer to [P2P Service](#).

Step

Action

The following table describes the P2P classification.

Table 18 – P2P Details

Classification		Description
P2P channel	User-defined frame	Edit the user-defined protocol
	MLDP client	Set dedicated service master
	Modbus TCP client (master)	Set to Modbus TCP master
P2P Block		Set each command block based on specified MLDP client of P2P channel.
User-defined frame		Set each command frame for the user-defined frame of P2P channel.
E-mail		Execute as defined by the user for E-mail service.

4. SoftMaster-NM Program

4.5. Connecting and downloading communication module parameters

4.5 Connecting and downloading communication module parameters

Download/Upload

SoftMaster-NM can be used for downloading or uploading the specified parameters stored in the PLC.

1. PLC type settings

Step	Action
1	To establish connection between SoftMaster-NM and PLC, select PLC type before connecting. To select the PLC type, from File menu, select New File . The following window displays.

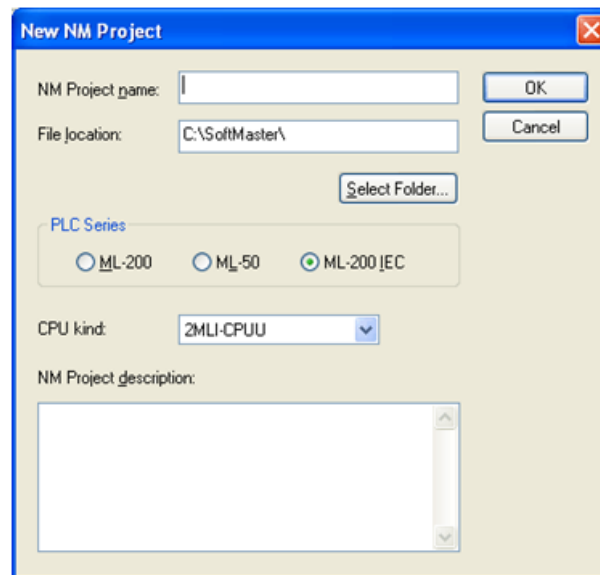


Figure 22 – CPU type setting in SoftMaster-NM

- 2 There are four selections for the CPU type like 2MLK CPUH, 2MLK CPUS. Confirm the type of PLC CPU to connect with SoftMaster-NM.

Select the exact type of CPU in the 'CPU kind' field as shown in the [Figure 22](#).

4. SoftMaster-NM Program

4.5. Connecting and downloading communication module parameters

2. Write (download)

Step

Action

- 1 Connect the FENet I/F module to the CPU base. The parameters can be written to the module through **Connect** option in the **Online** menu.

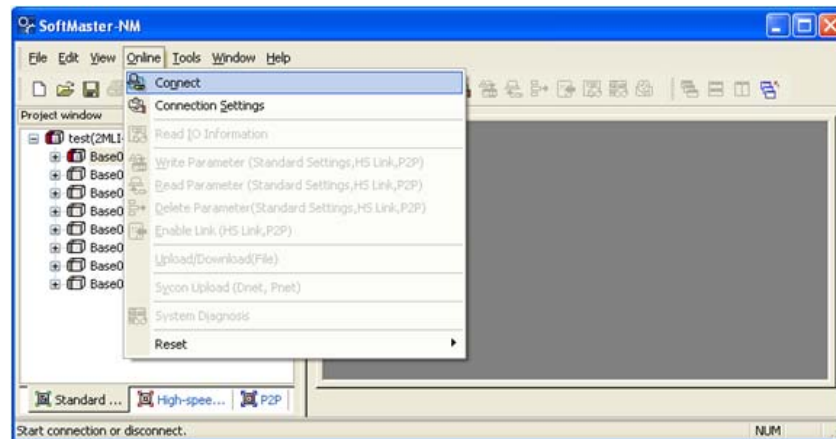


Figure 23 – Connect window



TIP

SoftMaster-NM can be used for connecting and programming using through RS-232C port or USB port of CPU module. Refer to CPU module's connection diagram for detailed cable type.

- 2 After connection is established, from **Online** menu, select **Write Parameter (Standard settings, HS link, P2P)** to download the parameters as shown in Figure 24. It specifies standard settings items of the base and slot positions of FENet I/F module for which the parameters are downloaded.

4. SoftMaster-NM Program

4.5. Connecting and downloading communication module parameters

Step

Action

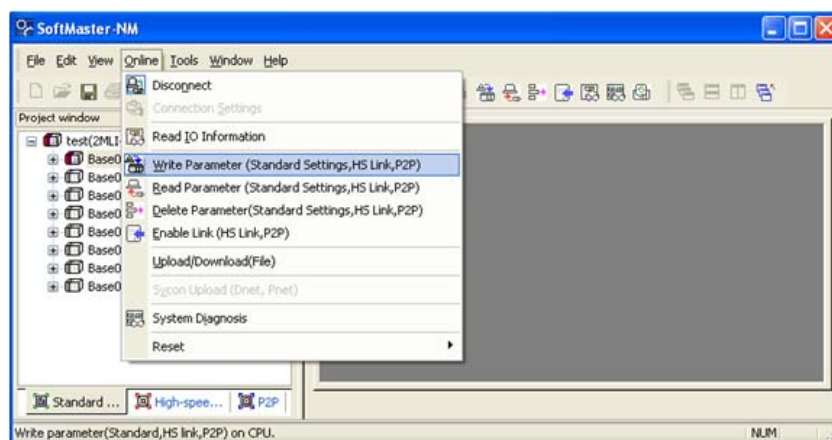


Figure 24 – Parameter Write window

- 3 From **Online** menu, select **Write Parameter (Standard settings, HS link, P2P)**. The following window displays.
-

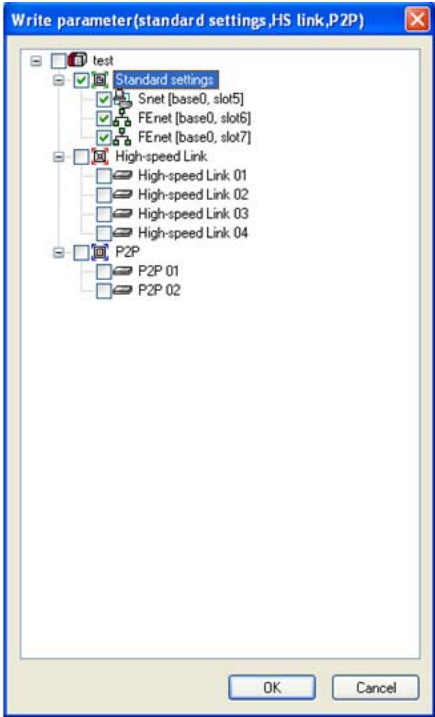
Step	Action
	

Figure 25 – Write window

After all the procedures listed above are complete, it means that Write frame files are completed. However, FEnet I/F module continue to operate with previously downloaded parameters. The module power should be recycled or the module should be reset after downloading for normal operation with the new parameters. Else, the operation continues with the old values.

3. Read (upload)

Step	Action
1	<p>Connect to the PLC CPU where FEnet I/F module is installed and read the communication module standard settings or register the module.</p> <p>From Online menu, select Read Parameter (standard settings, HS link, P2P) as shown in the following window.</p>

4. SoftMaster-NM Program

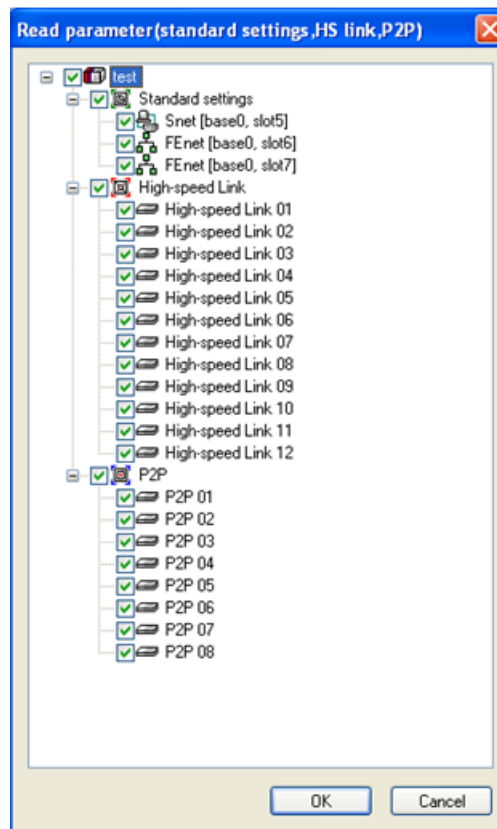
4.5. Connecting and downloading communication module parameters

Step	Action

Figure 26 – Read parameter window

- 2 From **Online** menu, select **Read Parameter** (standard settings, HS link, P2P).

The following window displays.

Step**Action****Figure 27 – Parameter read menu**

- 3** Confirm Base number and Slot number from the standard settings items, and then select standard settings of the applicable communication module.

After Read is completed, confirm the standard settings through the SoftMaster-NM window to find that the data read from FEnet module is saved.

4. SoftMaster-NM Program

4.5. Connecting and downloading communication module parameters

Link enable

Link enable procedures are required to start the communication for actual Tx/Rx of downloaded HS link and P2P data through SoftMaster-NM. Set Enable Link to ON to start Tx/Rx service of the communication module. It enables or disables the communication operation irrespective of the specified parameters. The communication status is maintained based on the Enable Link conditions even if CPU stops.

For enabling a channel in SoftMaster-NM, select **Enable Link (HS Link, P2P)** from the **Online** menu as shown in the following figure.

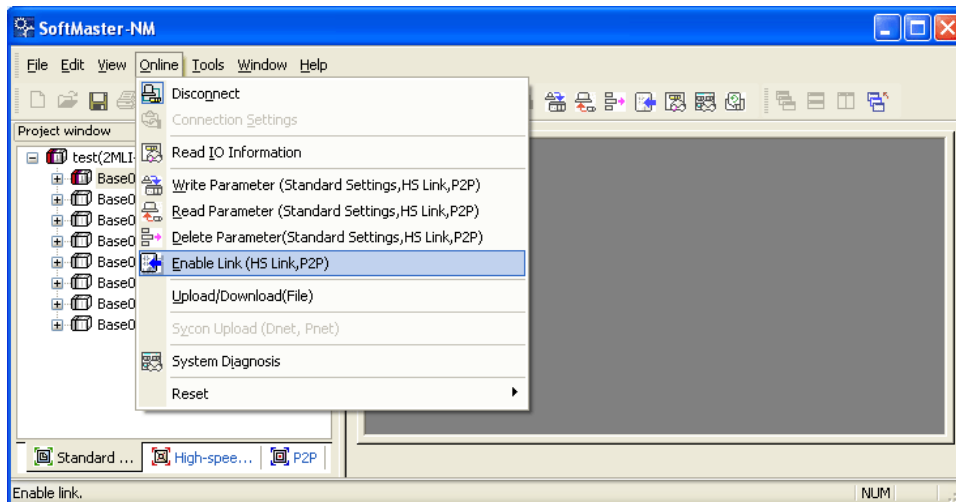


Figure 28 – Enable Link setting

Select the items that need the enabling of link service as shown in the [Figure 29](#).

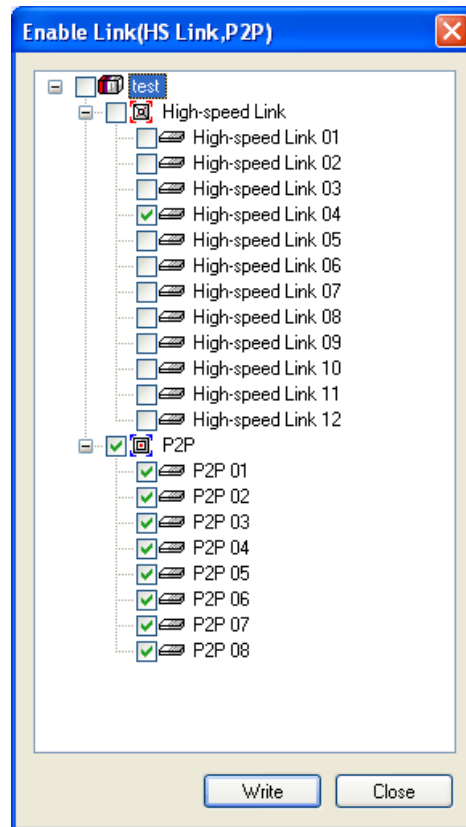


Figure 29 – Selection of Enable Link

If **Enable Link Write** is executed, a message displays as shown in [Figure 30](#), which means that link is enabled normally.

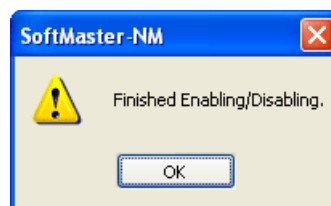


Figure 30 – Message window of Enable Link

4.6 System diagnosis

System diagnosis function is used for displaying general service status and information of the communication module during online status including link type, link information and O/S version. It allows you to precisely diagnose and debug the data Tx/Rx relation of the currently used communication module.

Execution of the diagnosis function

Perform the following steps, to execute diagnosis function.

Step	Action
1	Run SoftMaster-NM to connect to the CPU.
2	From Online menu, select System Diagnosis to display the options as shown in Figure 31.

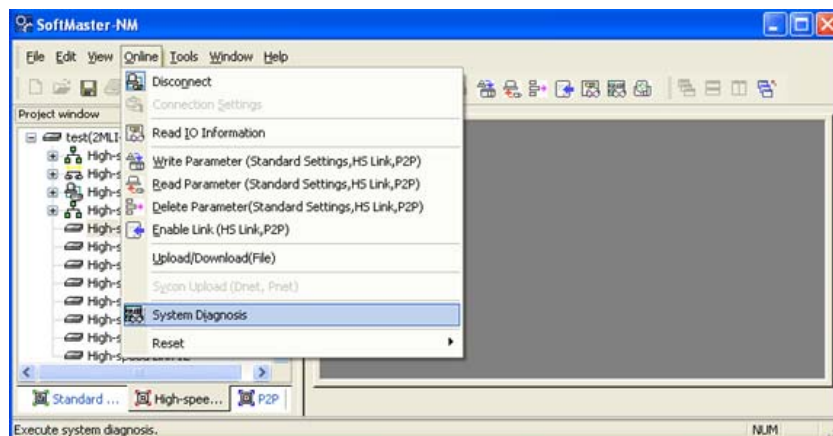


Figure 31 – Selection of system diagnosis function

3	It shows the base and slot information of the currently installed module and its operation status as shown in the Figure 31.
---	--

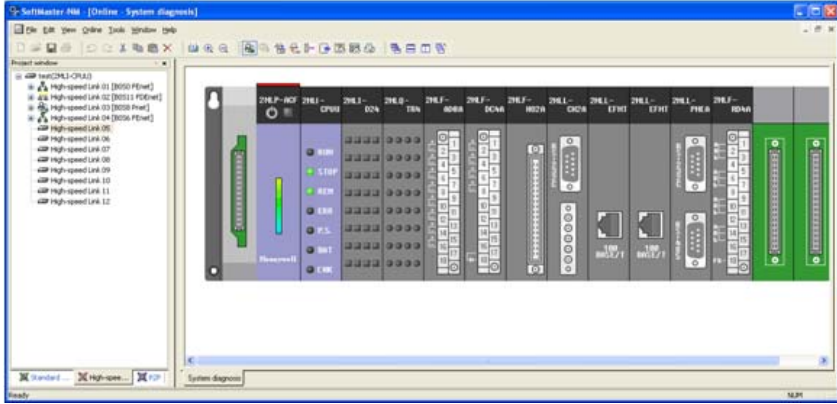
Step	Action
	

Figure 32– Module information (system diagnosis window)

Type of diagnosis functions

A pop-up menu in the initial diagnosis window (Figure 33) displays status information as well as diagnosis done for the various communication modules.

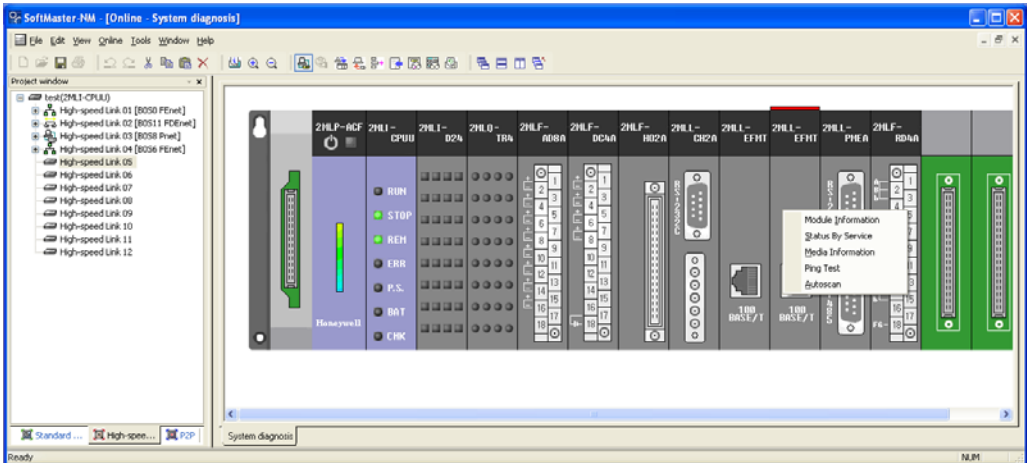


Figure 33 – Diagnosis function pop-up of module

Main functions for each item are described in [Table 19](#).

4. SoftMaster-NM Program

4.6. System diagnosis

Table 19 – Detailed diagnosis services

Classification	Description
CPU status	Displays currently connected CPU's type, operation status and error/warning if any.
Communication module information	Displays communication module's basic information, H/W and communication status.
Status by service	Displays the status of dedicated communication, P2P, HS link service, and so on.
Media information	Provides packet information of Tx/Rx data through media.
Ping test	Displays port connection status of other station specified on the network.
AutoScan	Provides active IP information for all the modules specified on the current network.

Following are the types of diagnosis function.

1. Communication Module Information:

Information about communication module shows basic information such as base information, HS link station number, IP information, and so on.

In addition to media and start status of the communication service, the user can confirm that the communication module normally transmits and receives the data.

Communication Module Information

Standard information

Base #: 0

Slot #: 7

Link type: FEnet

HS link Station #: 0

DHCP: Not used

IP address: 111.33.0.1

MAC ADDRESS: 00.E0.91.02.04.EA

Link information

Module Status: Normal

System parameter existence: Exist

Group existence: MLDP group

Speed/Full Duplex: AUTO_NEGOTIATION

Option board type: 100M FEnet module(TP/CAT5)

Run Mode / Additional information:

Run mode	Additional info.
Remote	Enable
Dedicated service	Enable

Hardware/Software information

Hardware version: 1.01

Hardware status: Normal

Software version: 2.10

Refresh Close

Figure 34 – Information of communication module

4. SoftMaster-NM Program

4.6. System diagnosis

2. Status by Service:

Service status of the communication module is classified into three types:

- Dedicated communication
- P2P and
- HS link

Service status shows the detailed information on the respective communication services.

a) Dedicated Communication:

It displays the service status of MMI or HMI dedicated protocol by means of higher client, and monitors Tx/Rx data and errors of the specified IP.

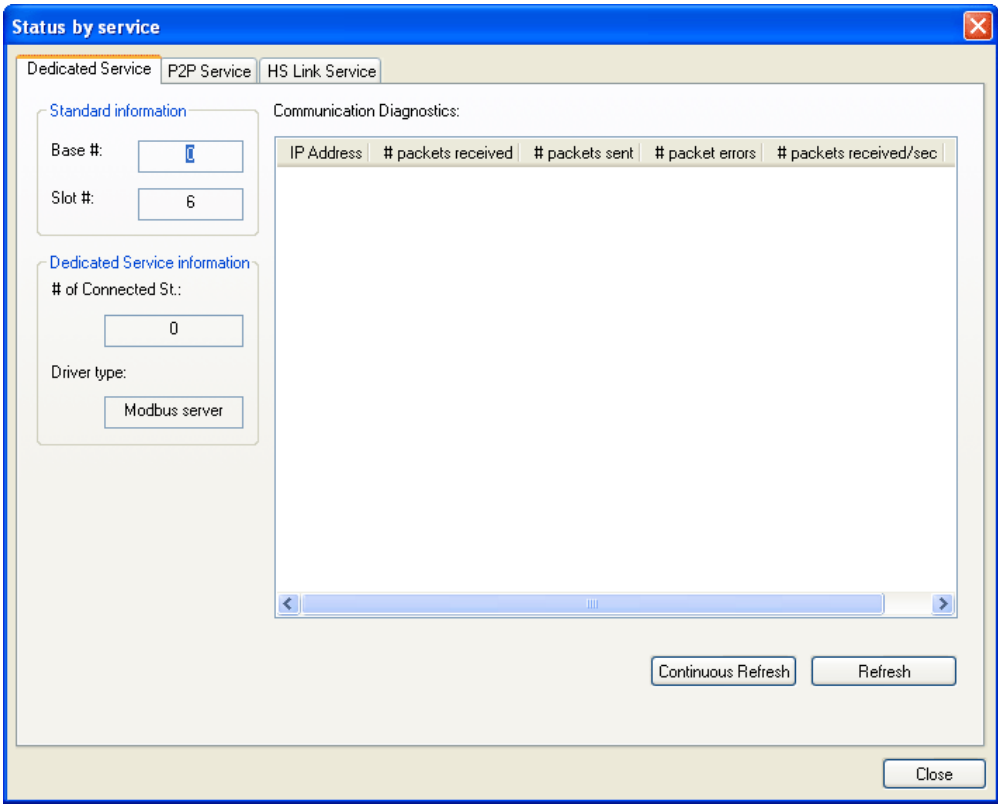


Figure 35 – Dedicated service monitor

4. SoftMaster-NM Program

4.6. System diagnosis

b) P2P service:

It displays detailed information on the user-defined service executed. It checks normal service to read if P2P parameters are set and enabled, where real time monitoring is available with Individual Read or Continuous Read specified on the menu.

The screenshot shows a software window titled "Status by service" with a blue header bar. Inside, there are three tabs: "Dedicated Service", "P2P Service" (which is selected and highlighted in orange), and "HS Link Service".

Under the "P2P Service" tab, there are two main sections:

- Standard information:** Contains two input fields: "Base #:" with the value "1" and "Slot #:" with the value "6".
- P2P service information:** Contains three fields: "Parameter existence:" with a dropdown menu showing "Exist", "Parameter task status:" with a dropdown menu showing "DOWNLOAD", and "# of blocks in service:" with a text box showing "0".

Below these sections is a section titled "Communication Diagnostics:" which contains a table with the following headers: "Block #", "Channel #", "Block status", "Connection status", "Service status", "Service count", and "Error count". The table body is currently empty.

At the bottom right of the window, there are two buttons: "Continuous Refresh" and "Refresh". A "Close" button is located at the very bottom right corner of the window frame.

Figure 36 – P2P service monitor

c) HS link service:

It monitors flags of respective parameters for HS link setting data. Run link, link trouble and individual information can be monitored by HS link service.

Status by service

Dedicated Service | P2P Service | **HS Link Service**

Standard information

Base #:
Slot #:

HS link service information

Sent Packets: The service of partial blocks is not available.
Received packets: (Run link: 0, Link trouble: 0)

Communication

Index	Station #	Block #	Block type	Data size	Read area	Write area	HS state	HS mode	HS trx	HS error
00	01	01	Master transmission	200	%MW200		Normal	Run	Normal	Normal
01	09	02	Master reception	200		%MW500	Error	Stop	Error	Normal

Continuous Refresh Refresh Close

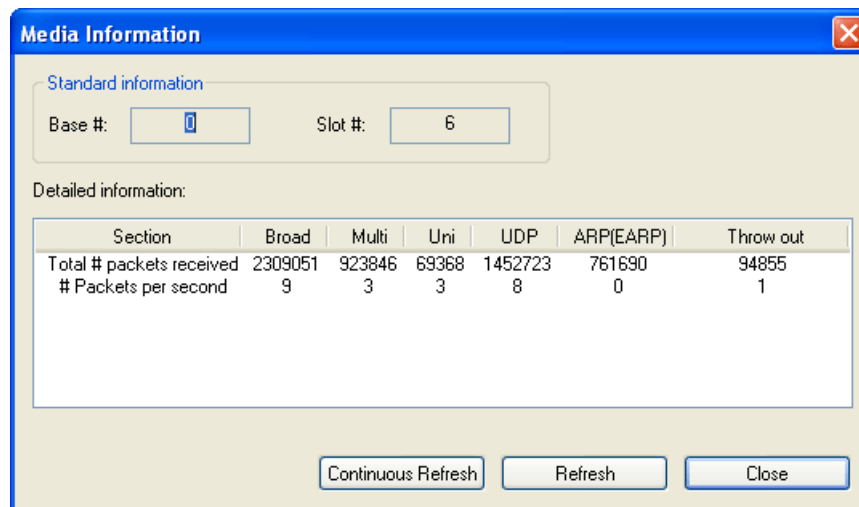
Figure 37 – HS link service monitor

4. SoftMaster-NM Program

4.6. System diagnosis

3. Media information:

It displays the statistics of packets received through the media.



The 'Media Information' dialog box features a blue title bar with a close button. It contains two sections: 'Standard information' with input fields for 'Base #' (0) and 'Slot #' (6), and 'Detailed information' which is a table of packet statistics. At the bottom are three buttons: 'Continuous Refresh', 'Refresh', and 'Close'.

Section	Broad	Multi	Uni	UDP	ARP(EARP)	Throw out
Total # packets received	2309051	923846	69368	1452723	761690	94855
# Packets per second	9	3	3	8	0	1

Figure 38 – Media information

4. Ping Test:

Ping Test is used for verifying the status of the communication link between FEnet I/F module and other stations on the network.

Ping Test

Standard information

Base #: 0

Slot #: 7

Standard settings

IP address: 199 . 63 . 43 . 43

of iterations: 3

Timeout: 1000 ms

Results

of attempts: 3

of successes: 0

of errors: 3

Message:

Timeout Failure: No reply from 199.63.43.43
Timeout Failure: No reply from 199.63.43.43
Timeout Failure: No reply from 199.63.43.43

Start Close

Figure 39 – Ping test monitor for destination station

4. SoftMaster-NM Program

4.6. System diagnosis

5. AutoScan:

This service scans and displays the link interface status of the whole network. The service status of FEnet I/F module connected with the public network displays as shown in the [Figure 40](#).

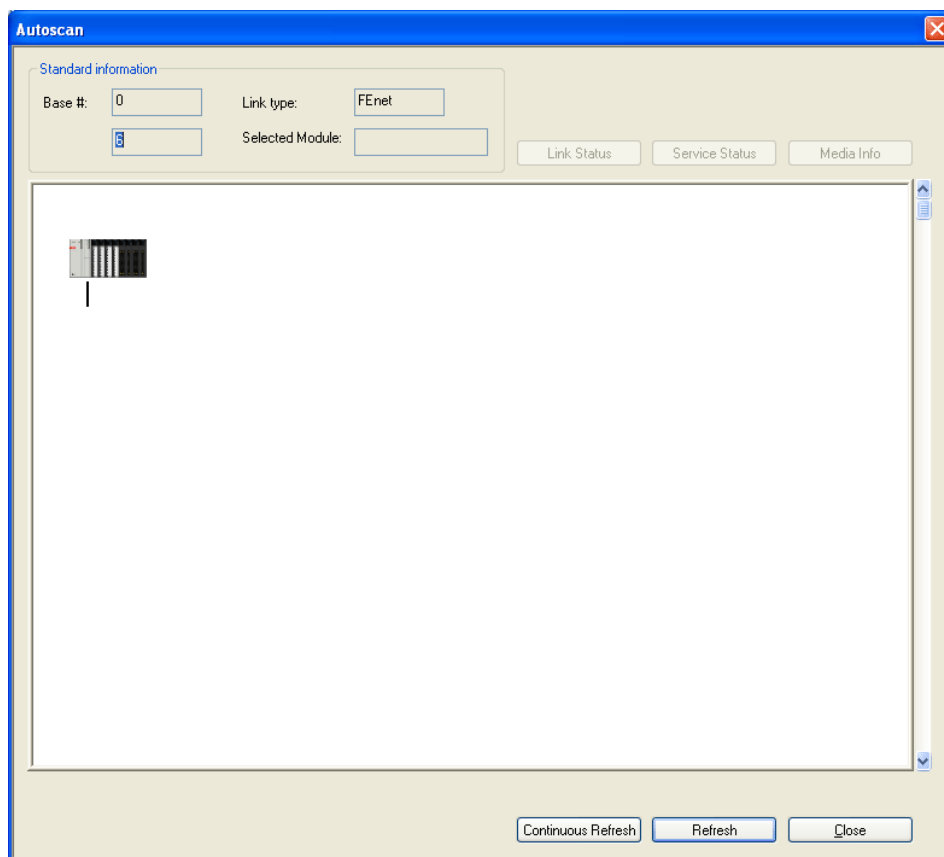


Figure 40 – Network Autoscan

5. HS Link Service

5.1 Introduction to HS link service

HS link is a communication method between MasterLogic-200 PLC communication modules and the slave modules to send and receive data with HS link parameters setting. This service allows using SoftMaster-NM to exchange data between the modules through parameters setting like Send/Receive data size, communication period and Send/Receive area to save data through its transmission service function.

However, since HS link service uses the subnet broad service, it may have an influence on other communication modules that use the identical network. To overcome this, setting of block size near the maximum Send/Receive size (400 bytes or 200 words) is available. HS link block is recommended for you to obtain the greatest communication efficiency with the lowest influence on other modules to reduce the sum of blocks.

HS link functions are specified as follows:

1. HS link block setting function
 - a) If there are many Send/Receive areas, up to 128 blocks can be setup.
 - b) Two hundred words of data is available per block.
2. Communication period setting function
 - a) Send/Receive period can be setup per block by user for the areas where fast Tx/Rx is required and not in a Tx/Rx period of 20ms to 10s.
3. Send/Receive area setting function
 - a) Send/Receive area can be setup per data block by user using the specified memory address.
4. Functions of HS link information
 - a) Reliable communication system can be easily configured by providing HS link information for user via the user keyword.

5. HS Link Service

5.1. Introduction to HS link service

The following table shows the data capacity of HS link communication whose basic unit is one word.

Table 20 – Maximum communication data capacity

Classification	Max. Communication Words	Max. Send Words	Max. Blocks	Max. Words per Block
2MLL-EFMT	25600	12800	128 (0-127)	200

5.2 HS link send/receive data processing

HS link application is described below where FEnet I/F modules assigned with stations numbers 0 and 1 to send and receive the data between each other.

The station number 0 transmits the data of 10 words from M000 to M009 with block number 0 and the data received from station number 1, is saved on M010. The station number 1 receives data of 10 words from the station number 0 to save on M030, and transmits the data of 10 words from M020 to M029 with block number 1.

There are 64 blocks for Send (Tx) data and 128 blocks for Receive (Rx) data in the HS link parameters. The block number can be set at 0–63 for transmission or 0–127 for receiving.

The Send side during setup of data transmission decides the data to be read and block number to be sent without setting the destination station number.

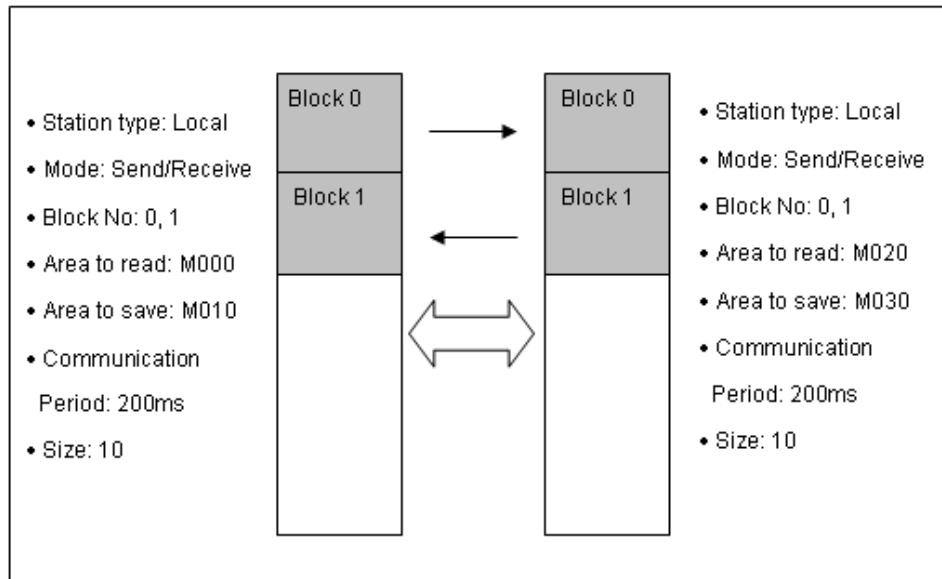
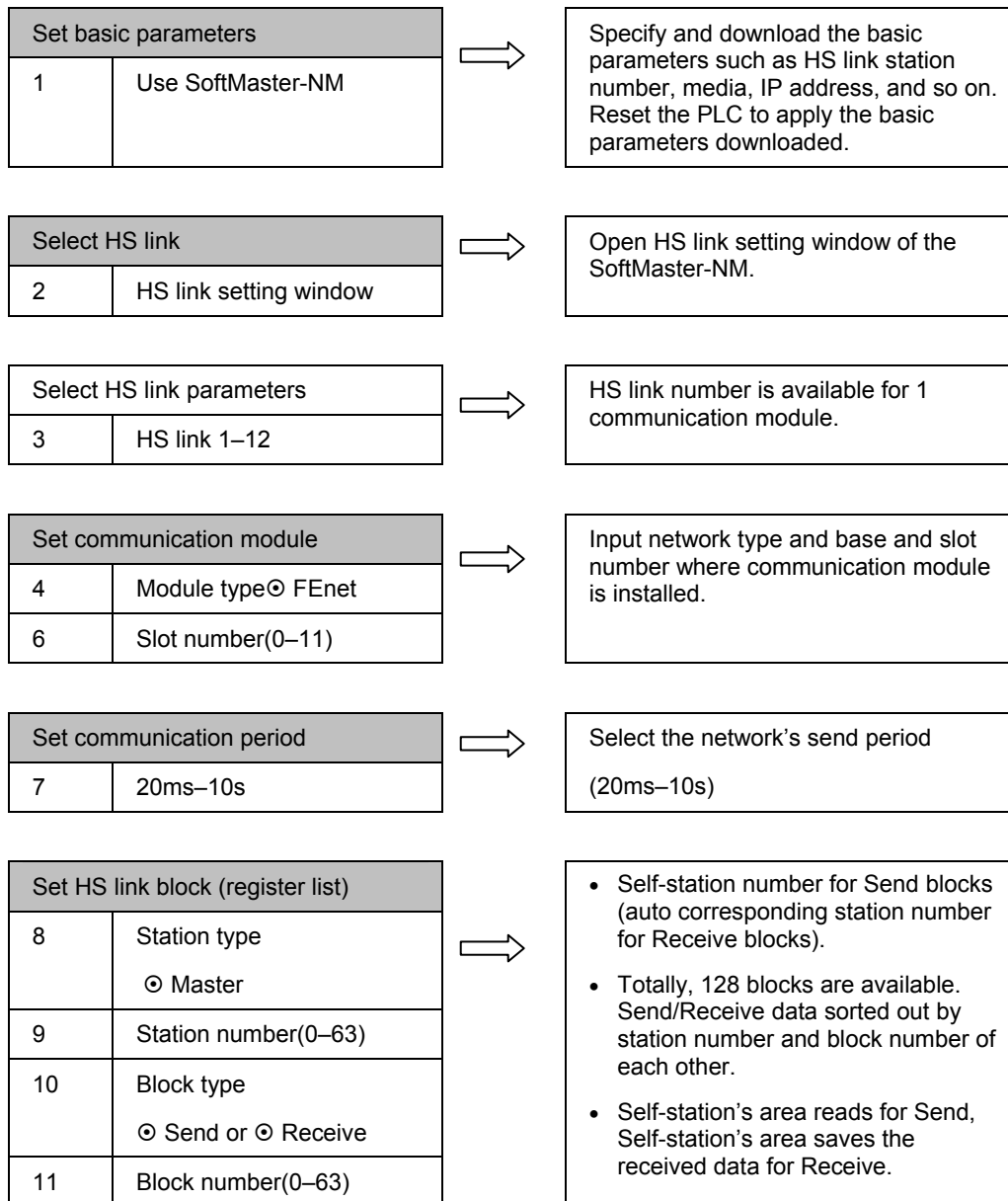


Figure 41 – Diagram of HS link processing blocks

5. HS Link Service

5.3. Operation sequence through HS link

5.3 Operation sequence through HS link



5. HS Link Service

5.3. Operation sequence through HS link

12	Read area/Save area
13	Size (1–200 words)

--

Online (after local-connected)	
14	Write ⊙HS link parameters



Download HS link parameters from SoftMaster-NM onto CPU.
--

Set link enable	
15	HS link1–12



Set link-enable for the applicable HS link number to get started with the HS link service in SoftMaster-NM.

Setup the parameters for corresponding station as in 1–15 and above.
--

5. HS Link Service

5.4. HS link parameters setting

5.4 HS link parameters setting

HS link parameters are setup by respective items for HS link after selecting HS link parameter number on the HS link window of SoftMaster-NM. The setting steps and the functions of respective items are explained below.

Execution of SoftMaster-NM

The initial window of SoftMaster-NM displays as shown in the following figure.

From **Tools** menu, select **Network Manager** on the menu bar of SoftMaster to execute SoftMaster-NM.

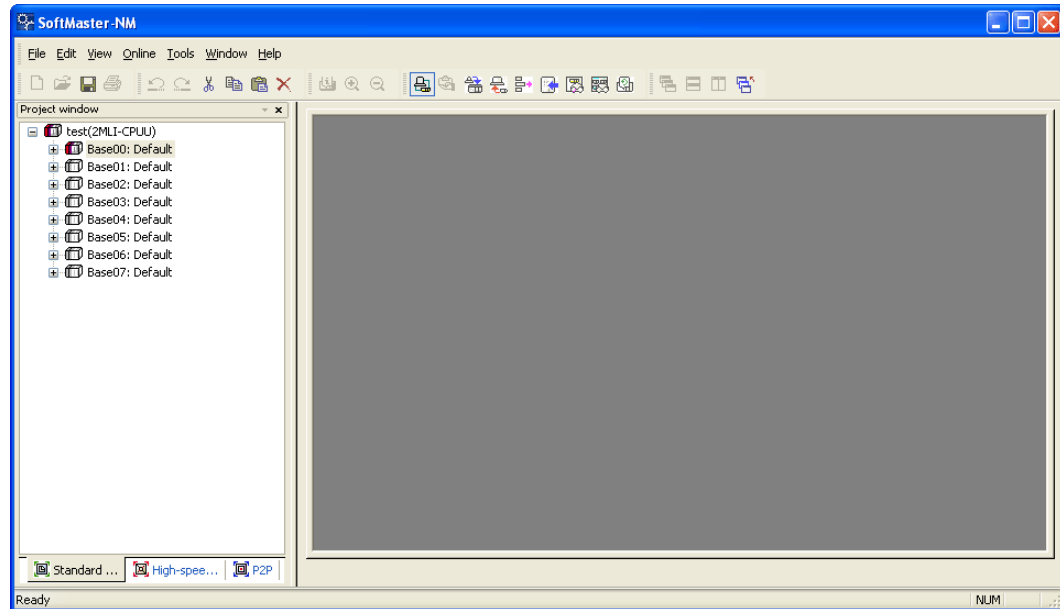


Figure 42 – Initial window of SoftMaster-NM

Standard settings (module)

1. Setting the communication module

Communication module setting can be registered off-line or online.



REFERENCE - INTERNAL

For more information, refer to [SoftMaster-NM Program](#).

2. Downloading standard settings

From **Online** menu, select **Write Parameter** to open the **Write parameter** window as shown in the [Figure 43](#). Check applicable standard settings and click **OK**. After standard settings are downloaded, recycle PLC power or reset the PLC. The new parameters are not applied unless the communication module is reset.

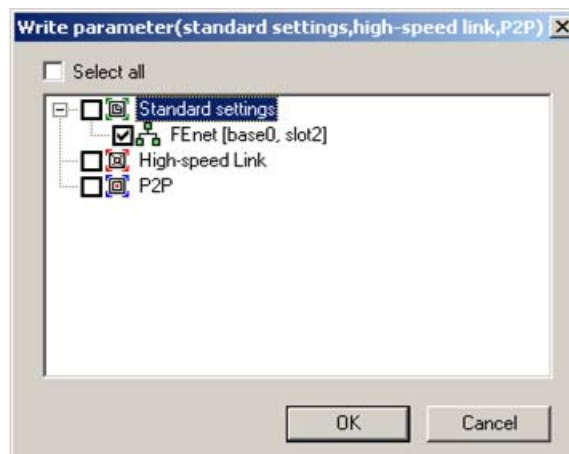


Figure 43 – Write parameter window

5. HS Link Service

5.5. High speed link parameters (HS Link)

5.5 High speed link parameters (HS Link)

1. Initial setting window of HS link parameters

Select HS link window on SoftMaster-NM to display the window where HS link parameters can be setup.

Twelve HS links are available for MasterLogic-200 series PLC and parameters settings are available for the communication modules installed on the basic or extended base.

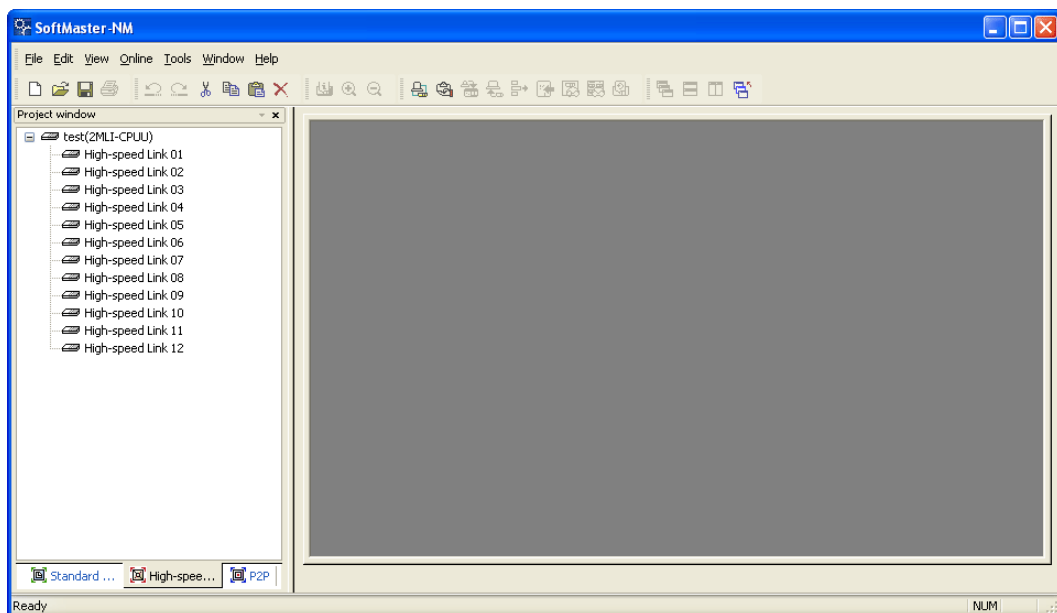


Figure 44 – Initial window of HS link settings

2. Communication Module Settings and Communication Period Settings

Double-click the HS link to setup communication module and communication period on one of the HS links 01–12 as shown in [Figure 44](#). This opens the Communication Module setting dialog box as shown in [Figure 45](#).

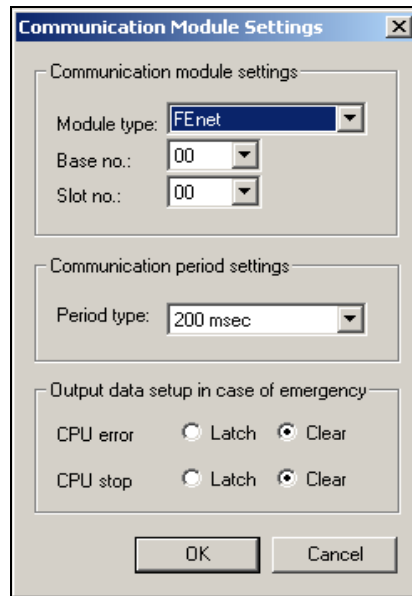


Figure 45 – Communication module setting

Setup the requisite Communication module and Communication period setting in the dialog box.

5. HS Link Service

5.5. High speed link parameters (HS Link)

Table 21 – Setting of communication module and communication period

Item	Description	
Communication module settings	Module type	Select the installed communication module type.
	Base number	Select the base number where requisite FEnet module is installed.
	Slot number	Select the slot number where requisite FEnet module is installed.
Communication period settings	Period type	<ul style="list-style-type: none">• HS link service is used to send and receive data by user-defined parameters when the execution of PLC program ends.• If the scan time of PLC program is as short as millisecond (ms) or less, the communication data will be increased.• The communication module sends data at the end of every scan that causes decreased efficiency of the whole communication system.• To prevent this, the communication is controlled by the specified communication period whose setting range is 20ms–10s, which will be automatically set to default of 200ms.• The communication period will be applied for Send blocks.• The communication period will be applied identically to all the Send blocks included in the same HS link parameter number.

3. HS link parameters settings

Click **OK** in **Communication module setting** window. The following window displays.

5. HS Link Service

5.5. High speed link parameters (HS Link)

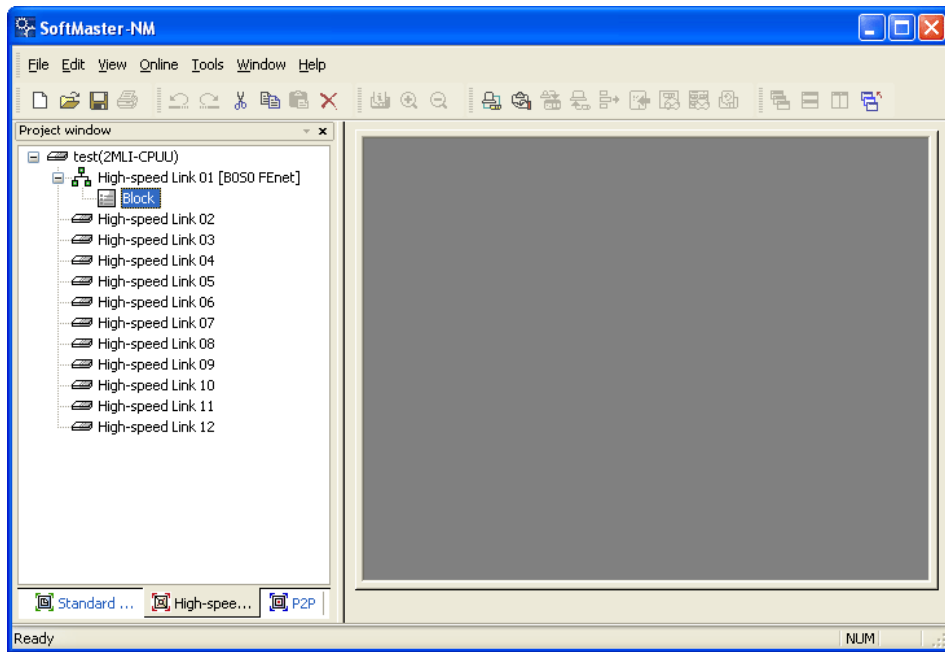


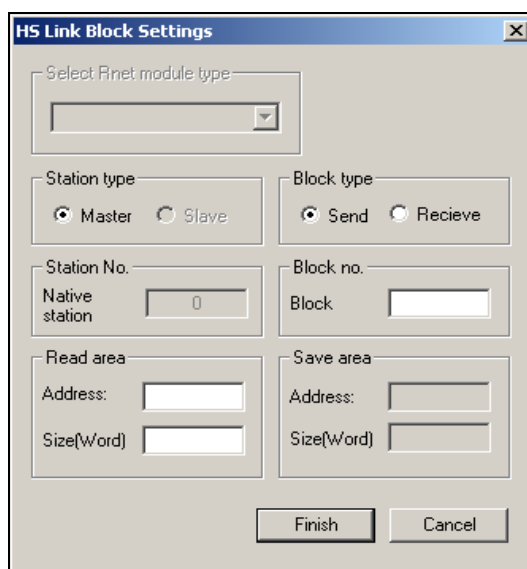
Figure 46 – HS link selection window

5. HS Link Service

5.5. High speed link parameters (HS Link)

4. Setting of HS link blocks

Right-click the HS link block and the **HS Link Block Settings** window displays as shown in Figure 47. The **HS Link Block Settings** enables you to register HS link blocks.



The image shows a Windows-style dialog box titled "HS Link Block Settings". It contains several configuration fields and buttons. At the top is a "Select Rnet module type" dropdown menu. Below this are two groups of radio buttons: "Station type" with "Master" (selected) and "Slave", and "Block type" with "Send" (selected) and "Recieve". Under "Station type" is a "Station No." field with a "Native station" label and a value of "0". Under "Block type" is a "Block no." field with a "Block" label. At the bottom are two sections: "Read area" and "Save area", each containing "Address:" and "Size{Word}" input fields. "Finish" and "Cancel" buttons are at the bottom right.

Field	Value / Option
Select Rnet module type	[Dropdown]
Station type	Master (selected), Slave
Block type	Send (selected), Recieve
Station No.	0
Block no.	[Empty]
Read area Address	[Empty]
Read area Size{Word}	[Empty]
Save area Address	[Empty]
Save area Size{Word}	[Empty]

Figure 47 – HS link block settings

The following table describes the fields of HS Link Block Settings window.

Table 22 – HS link settings

Classification		Description
Station type	Master	FEnet I/F module operate as master. Slave function is not supported.
Station number	Native/ destination station number	<ul style="list-style-type: none"> The HS link station number of self-station is setup automatically for the Send blocks. Setup the HS link station number of corresponding station for Receive blocks. Available station number for HS link with FEnet I/F module is '0–63'. Duplicated number is not allowed for station numbers of FEnet I/F modules included in the identical network.
Read area	Address	<ul style="list-style-type: none"> The data memory address where the data to be transmitted is stored. Available memory area: P, M, K, F, T, C, U, Z, L, N, D, R and ZR. Refer to the list of devices in the 2MLK CPU manual for available range of each memory area.
	Size (Word)	The size of data to be transmitted in word unit.
Block type	Send	Transmits data.
	Receive	Receives data.
Block number	Block number	Used to specify Send/Receive blocks.
Save area	Address	<ul style="list-style-type: none"> The data memory address to save the received data that is transmitted by the destination station. Available memory area: P, M, K, F, T, C, U, Z, L, N, D, R and ZR. Refer to the list of device in the 2MLK CPU manual for the available range of each memory area.
	Size (Word)	The data size of received block in word unit.

5. HS Link Service

5.5. High speed link parameters (HS Link)

5. Downloading HS link parameters

After HS link parameters settings are complete, from the **Online menu**, select **Write Parameter** (standard settings, HS link, P2P) on SoftMaster-NM, check the requisite HS link and then click **OK**.

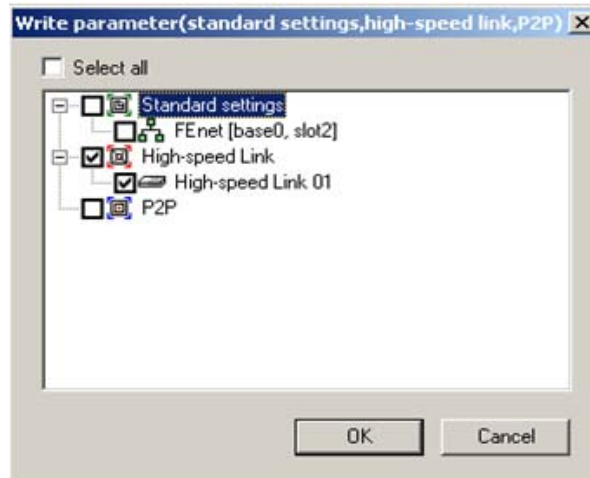


Figure 48 – Write parameters window

6. HS link parameters enable
 - a) From the **Online** menu, select **Link Enable** on SoftMaster-NM.
 - b) Select the requisite HS link and click **Write**.
 - c) If HS link is enabled, on the module's LED display, HS LED will be turned ON to start the HS link.

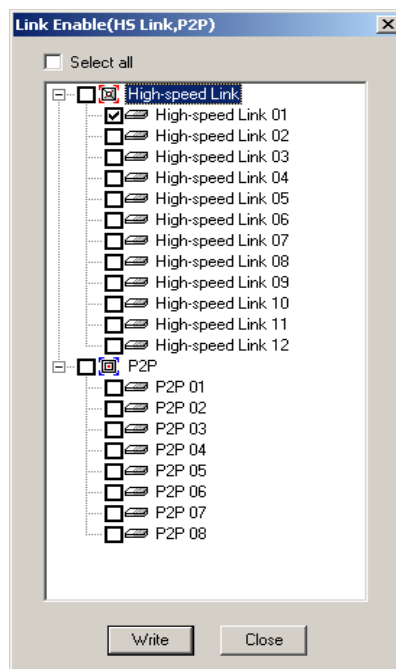


Figure 49 – Link enable window

5. HS Link Service

5.6. HS link information

5.6 HS link information

HS link flags

HS link service is used for exchanging data between communication modules of two or more stations. It provides a checking method of HS link service status for the user through HS link information. HS link information confirms reliability of the data read from the destination station via the HS link.

In other words, the communication module synthesizes the data received at specific time intervals. It helps to know if HS link is operated as per parameters specified by the user through HS link information. Run-link (_HSxRLINK) and Link-trouble (_HSxLTRBL) provides the whole information of the communication. The individual information of _HSxSTATE, _HSxTRX, _HSxMOD, and _HSxERR provides communication status of registered items that the parameters contain.

The user can use the information in keyword format when programming, and monitor the HS link status using the monitor function of the HS link information. Before its application, the user is requested to check the reliability of the communication data through HS link information of Run-link and Link-trouble when operating several PLCs with HS link service. The following table displays the functions and definition of the HS link information.

Table 23 – Definition of HS link information

Classification	Run-Link	Link-Trouble	Tx/Rx Status	Operation Mode	Error	HS Link Status
Information type	Whole information	Whole information	Individual information	Individual information	Individual information	Individual information
Keyword name (x=HS link Number)	_HSxRLINK	_HSxLTRBL	_HSxTRX[n] (n=0–127)	_HSxMOD[n] (n=0–127)	_HSxERR[n](n=0.–127)	_HSxSTATE[n](n=0–127)
Data type	Bit	Bit	Bit-Array	Bit-Array	Bit-Array	Bit-Array
Monitor	Available	Available	Available	Available	Available	Available
Program	Available	Available	Available	Available	Available	Available

Select **Variable/Comment** on the SoftMaster project window. The following window displays. Move the device to be monitored on to the variable monitor window.

	PLC	Type	Device	Value	Variable	Comment
1	_HS1_RLINK	BIT	L000000			
2	_HS2_RLINK	BIT	L000500			
3	_HS3_RLINK	BIT	L001000			
4	_HS4_RLINK	BIT	L001500			
5	_HS5_RLINK	BIT	L002000			
6	_HS6_RLINK	BIT	L002500			
7	_HS7_RLINK	BIT	L003000			
8	_HS8_RLINK	BIT	L003500			
9	_HS9_RLINK	BIT	L004000			
10	_HS10_RLINK	BIT	L004500			
11	_HS11_RLINK	BIT	L005000			
12	_HS12_RLINK	BIT	L005500			

Monitor 1 / Monitor 2 / Monitor 3 / Monitor 4 /

Figure 50 – Variable monitor window

1. Run-link (_HSxRLINK)

It shows if HS link is normally active through the user-defined parameters. The HS link status will be 'ON' once enabled until disabled by setting Link Enable to 'OFF'. The HS link will be 'ON' under the conditions specified below.

- If Link Enable is 'ON'.
- If all the register list settings of parameters are specified normally.
- If all the data applicable to the parameters register list is transmitted and received as specified in the period.
- If the status of all the destination stations specified in the parameters is RUN with no error at the same time.

2. Link-trouble [_HSxLTRBL where x is HS link number(1–12)]

It shows if HS link is normally executed through the user-defined parameters, which is turned 'ON', the Run-link flag is violated when Run-link is ON, and is turned OFF if the condition is recovered.

3. Tx/Rx status (_HSxTRX[0..127] where x is HS link number(1–12))

It shows the operation status of HS link parameters on the register list, up to 128 registered items' Tx/Rx information. If the Tx/Rx operation of the registered items is

5. HS Link Service

5.6. HS link information

agreeable to the Tx/Rx period, the corresponding bit will be turned ON, else it will be turned Off.

4. Operation mode (`_HSxMODE[0..127]` where x is HS link Number (1–12))

It shows the operation status of HS link parameters on the register list up to 128 registered items' operation mode information just like the max. register number. If the station specified in the register item is in Run mode, the corresponding bit will be turned ON, and if in Stop/Pause/Debug mode, it will be turned OFF.

5. Error (`_HSxERR[0..127]` where x is HS link Number (1–12))

It shows the operation status of HS link parameters on the register list up to 128 registered items' error information just like the max. register number. The error displays the general status of the PLC that fails to execute the user program. If the destination station PLC is normal, it will be turned Off, and if abnormal, it will be turned On.

6. HS link status (`_HSxSTATE[0..127]` where x is HS link Number (1–12))

It shows the operation status of HS link parameters on the register list up to 127 registered items' HS link status just like the max. register number, which synthesizes the information of the individual items to display the general information of the registered items. In other words, if the applicable list's Tx/Rx status is normal with the operation mode of Run and with no error, it will be turned ON, and if the conditions above are violated, it is turned OFF.

Monitoring HS link information

HS link information can be checked through the variable monitor on the **Monitor** menu when SoftMaster state is 'Online', or through the SoftMaster-NM diagnosis service.

1. Variable monitor

Variable monitor is a function used for registering the variables to be monitored and then monitor the selected variables. From the **View** menu, select **Variable Monitor Window** to display the variable registration window as shown in [Figure 50](#), and choose the flag directly to select and register HS link information flags one by one on the window of the variable flags list.

Since `_HSxSTATE[n]`, `_HSxERR[n]`, `_HSxMOD[n]` and `_HSxTRX[n]` are the flags of array type, the user needs to directly select the array numbers which stand for the register numbers inside the parameters.

2. HS link monitor through the SoftMaster-NM diagnosis services
 - a) It is available through the **Online** menu on SoftMaster-NM. From the **Online** menu, select **System Diagnosis**.

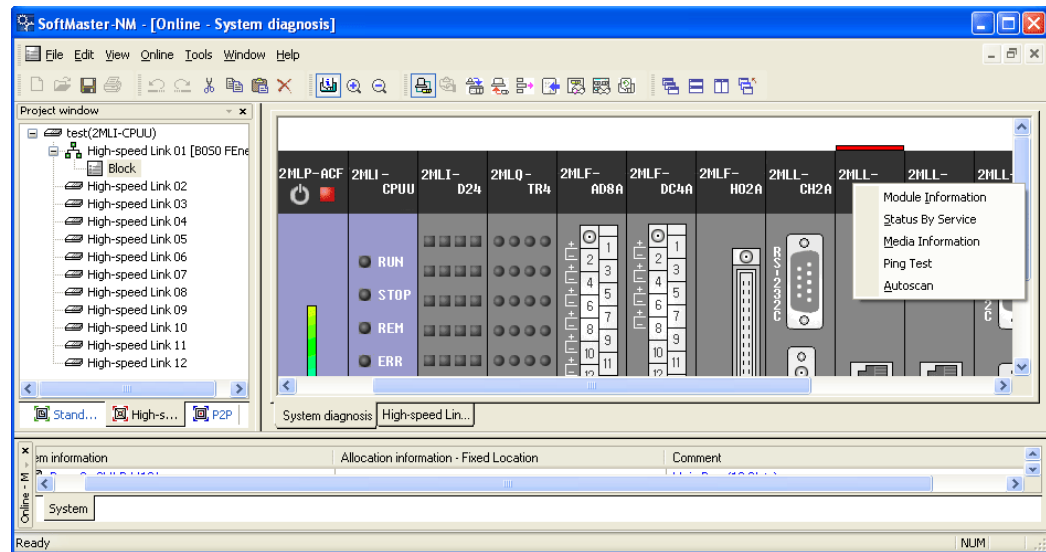


Figure 51 – System diagnosis

5. HS Link Service

5.6. HS link information

Table 24 – Details of system diagnosis

Item	Description
Link type	Displays communication module type.
Option type	Displays media type of communication module.
H/W status	Displays H/W status.
H/W version	Displays H/W version.
OS version	Displays OS version.
OS date	Displays OS released date.
Remote connection status	Displays remote connection status.

3. Place the cursor on the applicable module, right-click and select **Status for Respective Services** to open the following window.

5. HS Link Service
5.6. HS link information

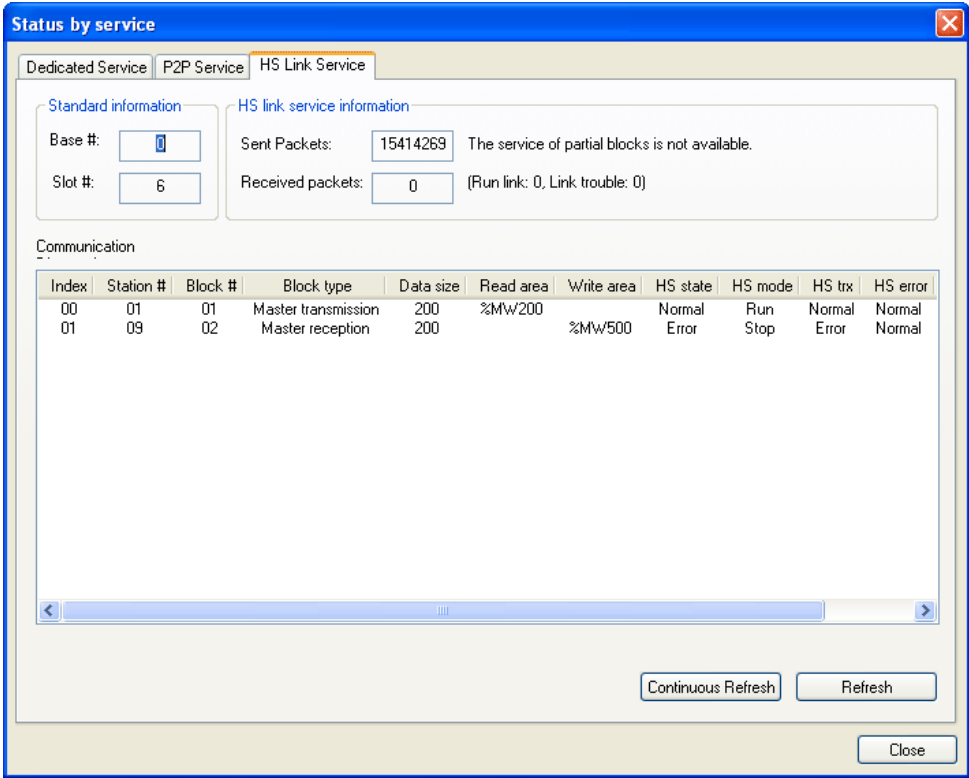


Figure 52 – SoftMaster-NM diagnosis services

5. HS Link Service

5.6. HS link information

6. P2P Service

6.1 Introduction to P2P service

P2P service uses Master operation of the communication module. It is accomplished through parameter setting with function blocks. Six P2P commands available in FEnet I/F module are Read, Write, Send, Receive, ESend and EReceive.

The registration and editing of P2P service parameters is executed in SoftMaster-NM where a maximum of eight P2P parameters can be setup. Respective P2P parameter is composed up to 64 P2P blocks.

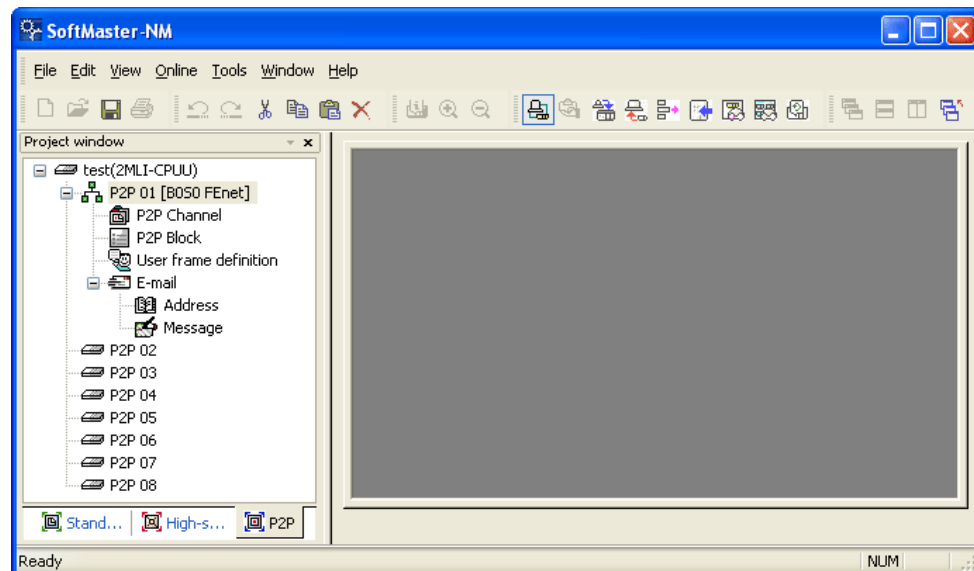


Figure 53 – P2P parameters setting window of SoftMaster-NM

1. P2P parameters registration window
 - a) You can setup a maximum of eight P2P parameters.
 - b) You can setup multiple P2P parameters for an identical communication module. However, 'Enable' is available only for one parameter among the multiple P2P parameters for the identical communication module.
 - c) Respective P2P parameters are composed of P2P channel, P2P block, user-defined frame and e-mail.

6. P2P Service

6.1. Introduction to P2P service

2. P2P edit window

- a) A maximum of 64 P2P blocks can be registered and edited.
- b) Separate frame registration is available for respective drivers.

Configuration of P2P parameters

P2P service is used for setting the operation desired using the P2P parameters window. Specify module type, base and slot number of the module on the P2P window to open P2P parameters setting window. The window is composed of four kinds of information as shown in the figure below:

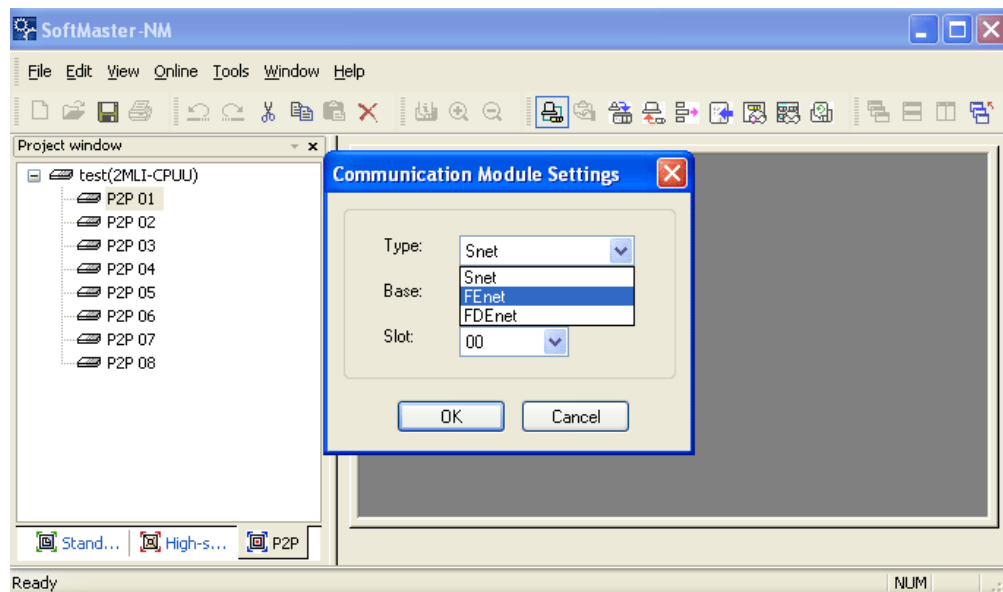


Figure 54 – P2P parameters module setting

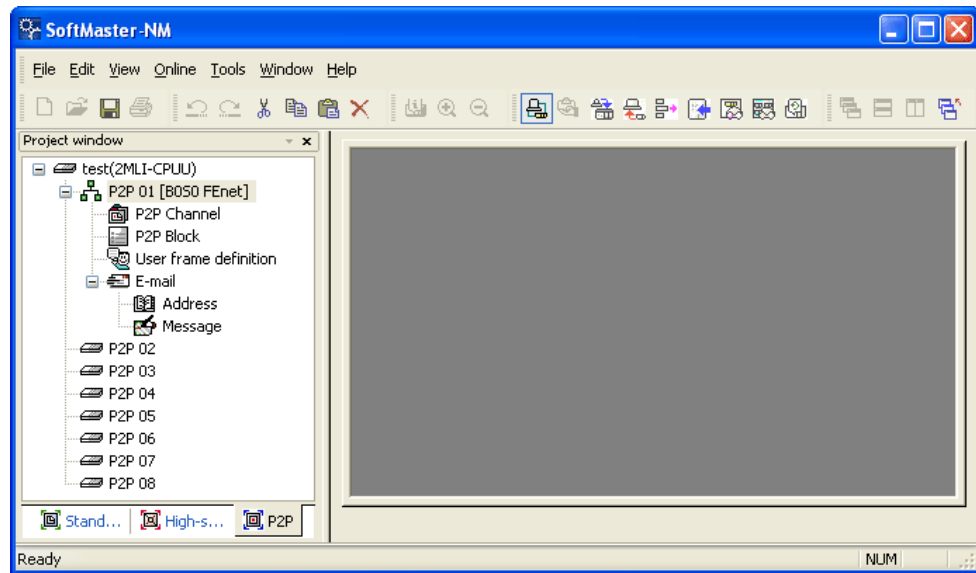


Figure 55 – Setting and registration window of P2P parameters

1. P2P channel
 - a) Logical channel of P2P Service (IP, PORT, dedicated driver) to be used can be setup.
 - b) User-defined frame, MLDP client and MODBUS TCP client setting is available.
 - c) Communication device setting which uses protocol other than MLDP/MODBUS TCP is available.
2. P2P block
 - a) There are 64 P2P blocks setting. The blocks are separately operated.
3. Define user frame
 - a) Registration of user-defined frames.
4. E-mail
 - a) Frame registration to transmit and receive frames via e-mail.

6. P2P Service

6.2. P2P service types

6.2 P2P service types

There are six commands available which can use MLDP, Modbus TCP protocols and user-defined frames to achieve P2P communication.

P2P commands

1. P2P commands

Six commands are available for programming P2P communication service and each command used with different purpose according to respective service methods as described in the table below.

Table 25 – Type of P2P commands

Classification	Command	Purpose
MLDP CLIENT	Read	Reads the area specified by destination station.
	Write	Transmits native station's area data to destination station.
USER DEFINE	Send	Transmits native station's area data to destination station.
	Receive	Saves the data received from destination station.
MODBUS TCP	Read	Reads the area specified by destination station.
	Write	Transmits native station's area data to destination station.
E-mail	Esend	Transmits a message if an event occurs.
	Ereceive	Receives a message if an event occurs.

Types of P2P service

1. MLDP CLIENT

This service is used for communicating between MasterLogic-200 FEnet I/F modules. You can specify communication settings with basic settings of channel, data type (BIT, BYTE, or WORD) and memory area through its own built-in protocol without any additionally defined frames. It uses port number 2004 for TCP and port number 2005 for UDP protocol.

2. User-Defined Frame

This service is used for communicating between MasterLogic-200 FEnet I/F module and other company's Ethernet devices. Since different brands define the communication protocol of devices based on Ethernet differently, it is difficult to provide all kinds of communication drivers for respective device. So the user is allowed to appropriately edit the characteristics of the requisite communication module. The user needs to specify User-Defined Frame and then define the structure of user-defined Ethernet frames with basic structure composed of Header, Body and Tail. Up to 16 channels can be specified.

3. MODBUS TCP

MasterLogic-200 FEnet supports Modbus protocol widely as well as User-Defined protocol.

6. P2P Service

6.3. Setting P2P service

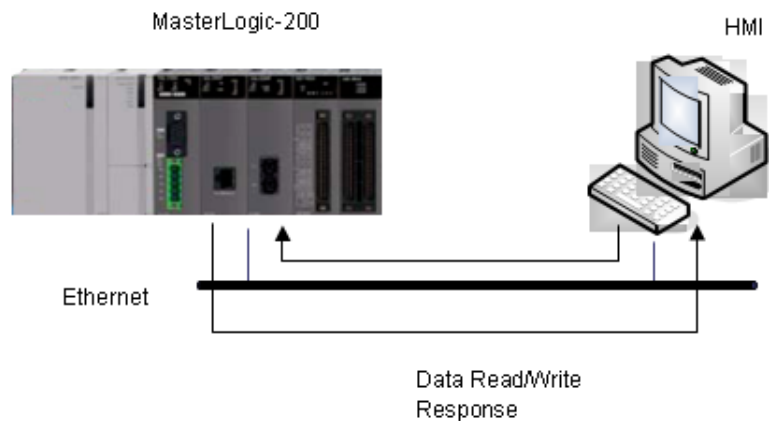
6.3 Setting P2P service

Ethernet (server) driver

1. Driver setting

Ethernet (server) driver stands for the protocol that is in-built in MasterLogic-200 FEnet module. Two kinds of server protocol, MLDP server and MODBUS TCP/IP are built-in MasterLogic-200 FEnet I/F module.

Ethernet (server) driver can be used for communicating between Ethernet devices with MLDP or MODBUS TCP/IP protocol. The destination station in Ethernet communication system is generally a MMI (or HMI). The communication is available with the corresponding device only through parameters setting without additional communication programming by the user.



2. [Figure 56](#) – An example of Ethernet (server) driver application
3. shows an example of communication with MMI PC with Ethernet driver used, where FEnet responds if MMI PC requests to read or write data.

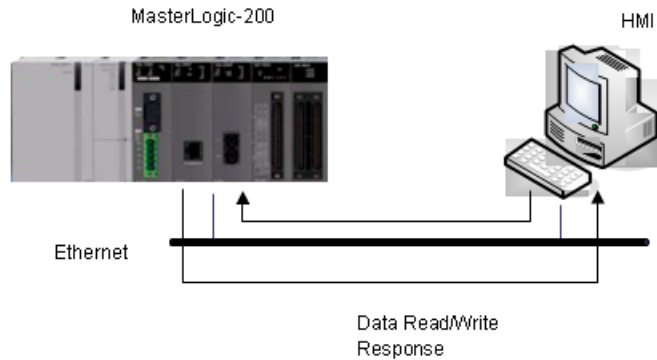


Figure 56 – An example of Ethernet (server) driver application

4. Type of Ethernet (server) drivers

Driver types available are specified below:

Table 26 – Types of Ethernet (server) drivers

Type	Description
MLDP server	MasterLogic-200 FEnet dedicated protocol by Honeywell
MODBUS TCP/IP server	Open type of protocol by Modicon



TIP

- The number of drivers used changes as per the specified Ethernet channel. If Ethernet channel is specified, then the number of drivers available can be decreased as specified.
- Ethernet (server) driver supports 1: N communication, where several master devices can take data through a connected port.

P2P channel

Ethernet P2P channel is used when MasterLogic-200 FEnet I/F module operates as the Master when communicating with built-in MLDP protocol or user-defined protocol.

6. P2P Service

6.3. Setting P2P service

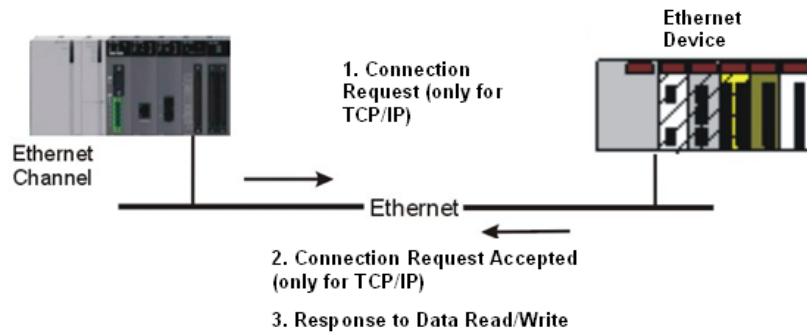


Figure 57 – Application of P2P channel information

1. Setting of P2P channel

FEnet I/F module can send and receive data for up to 16 channels, which is composed of IP address and port number for two Ethernet devices. The number of channels available for P2P service is the maximum number of channels (16) minus the number of dedicated connections in the basic parameters. (The number of P2P channels = 16 – the number of dedicated connections).

P2P communication is available with simple parameters setting to communicate with the devices using MLDP or MODBUS TCP protocol. For communication with devices other than described above, user can directly define frames as necessary. In addition, messages and e-mail addresses can be registered to transmit and receive e-mail frames (ASCII supports). However, it is not necessary to set the channel for e-mail communication. If P2P channel is selected on the P2P setting window, the P2P channel setting window displays as follows:

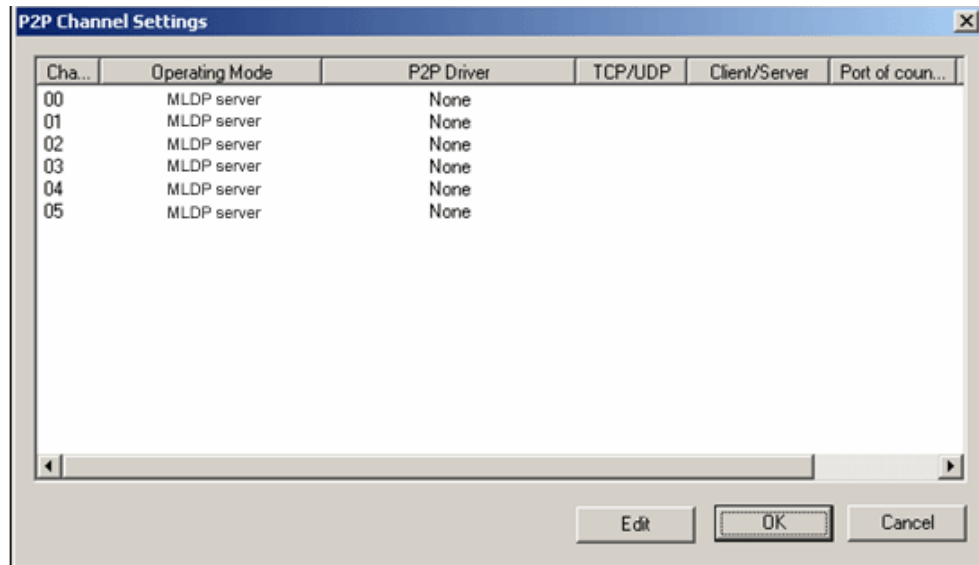


Figure 58 – P2P channel settings window

If the desired channel is selected, 'P2P channel settings' window displays for you to define P2P driver type applicable for the port.

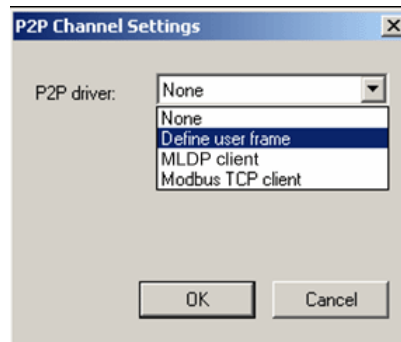


Figure 59 – P2P driver client setting

Drivers and details available in MasterLogic-200 FEnet I/F are as follows:

6. P2P Service

6.3. Setting P2P service

Table 27 – Type of P2P driver clients

Drivers	Details
None	P2P service not used.
Define user frame	Used to send/receive data with user-defined frame.
MLDP client	Used to send/receive data with Master Logic dedicated protocol.
Modbus TCP client	Used to send/receive data with Modbus/TCP protocol.

If MLDP or Modbus is selected as P2P driver type for the communication port, user-defined frame cannot be registered.

a) Using Modbus driver

Table 28 – Modbus TCP address MAP

Code	Function Code Name	Modicon PLC data Address	Remarks
01	Output Contact Status Read (Read Coil Status)	0XXXX(bit-output)	Bit Read
02	Input Contact Status Read (Read Input Status)	1XXXX(bit-input)	Bit Read
03	Output Register Read (Read Holding Registers)	4XXXX(word-output)	Word Read
04	Input Registers Read (Read Input Registers).	3XXXX(word-input)	Word Read
05	Output Contact 1 Bit Write (Force Single Coil)	0XXXX(bit-output)	Bit Write
06	Output Register 1 Word Write (Preset Single Register)	4XXXX(word-output)	Word Write
15	Output Contact Continuous Write (Force Multiple Coils)	0XXXX(bit-output)	Bit Write
16	Output Register Continuous Write (Preset Multiple Register)	4XXXX(word-output)	Word Write

2. P2P channel settings

In order to use P2P service, set the channel first and then IP address of the device to communicate.

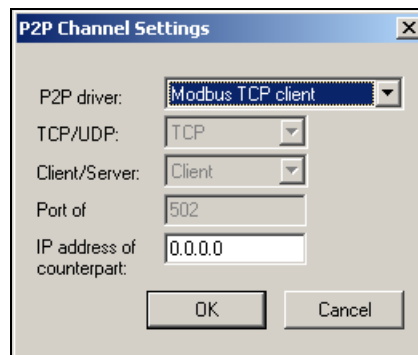


Figure 60 – Setting example of Modbus TCP channel

Details of the driver setting items are as described below:

Table 29 – Driver settings

Item		Description
P2P driver	None	Not specified
	User-defined frame	User-defined frame is used as communication protocol.
	MLDP client	The MasterLogic dedicated protocol is used as communication protocol. Since MLDP is built-in, the user-defined frame is needless to be registered.
	Modbus TCP client	The Modbus TCP protocol is used as communication protocol. Since Modbus TCP protocol is built-in, the user-defined frame is needless to be registered.
TCP/UDP		Select between TCP/UDP. If MODBUS is selected, TCP is fixed.

6. P2P Service

6.3. Setting P2P service

Item	Description
Client/Server	Select between Client/Server. If the protocol is selected between MLDP/Modbus TCP, client is fixed.
Destination station port	Input the port number of the destination station. If the protocol of the user-defined frame is to be defined, specify an optional port number whose available range is H400–H1024. However, MLDP client is fixed to 2004, and Modbus TCP client to 502.
IP address of counterpart	Input IP address of corresponding device to communicate with MasterLogic-200 FEnet through the specified channel.



ATTENTION

IP address of the destination station:

- If the client uses MLDP, specify IP address of the server equipment.
 - If a dynamic IP address has been assigned to the server by means of DHCP, the communication is unavailable due to different IP specified. Thus, a fixed IP address will be assigned.
 - If DHCP is used for server equipment, the communication is unavailable.
-

Defining user frame

Send/Receive frames are defined as, if the frames to be sent or received have a structure different from the structure of MLDP dedicated frame or Modbus TCP frames in the network. This is available only in P2P service.

All the frames are composed of Header, Data and Tail that can be omitted, respectively. In MLDP, user-defined frames displays group name and frame name whose details are as follows:

1. Group
 - a) Group of frames with identical header and tail
 - b) Group registration is necessary for the frame registration.
2. Frame

- a) It is composed of Header, Body and Tail.
 - b) Send/Receive frame is defined.
 - c) Fixed and variable size variables can be added to Body.
 - d) Frame is composed of lots of segments, and up to four variable segments can be registered for a Body.
3. Type of segments
- a) Header, Body and Tail of the frame are composed of lots of segments that can be registered on the frame edit window as shown below:

Nu...	Form	Size	Data	Memory
00	Numerical constant	1	05	
01	String Constant	3	TST	

Figure 61 – Registration of segments

Segments used for configuring the frame are numerical constant, String Constant, Fixed or Variable size variables.

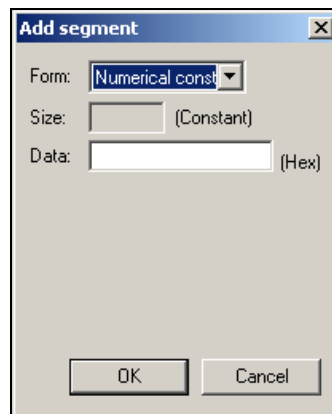
A dialog box titled "Add segment" with a close button (X) in the top right corner. It contains three input fields: "Form:" with a dropdown menu showing "Numerical const", "Size:" with a text box and "(Constant)" to its right, and "Data:" with a text box and "(Hex)" to its right. At the bottom are "OK" and "Cancel" buttons.

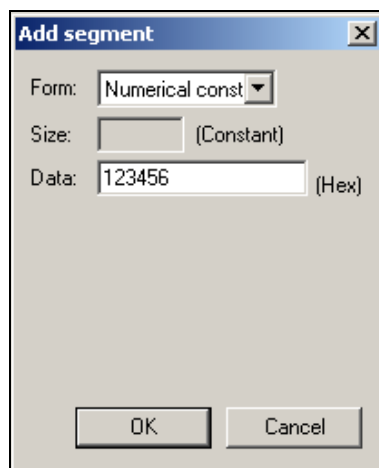
Figure 62 – Add segment window

4. Numerical constant

The part to be named as Constant will be defined among frames, with the data item value specified in hexadecimal.

6. P2P Service

6.3. Setting P2P service

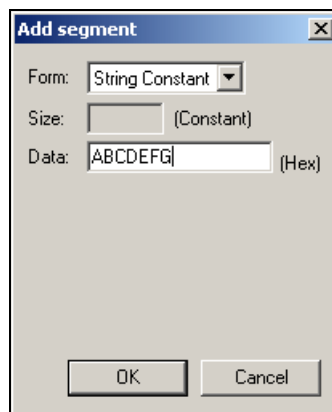


The 'Add segment' dialog box has a title bar with a close button. It contains three fields: 'Form' with a dropdown menu set to 'Numerical const', 'Size' with an empty text box and '(Constant)' to its right, and 'Data' with a text box containing '123456' and '(Hex)' to its right. At the bottom are 'OK' and 'Cancel' buttons.

Figure 63 – Numeric constant to select and input

5. String Constant

String Constant is registered among frames, with the data item value specified in ASCII code.



The 'Add segment' dialog box has a title bar with a close button. It contains three fields: 'Form' with a dropdown menu set to 'String Constant', 'Size' with an empty text box and '(Constant)' to its right, and 'Data' with a text box containing 'ABCDEFGH' and '(Hex)' to its right. At the bottom are 'OK' and 'Cancel' buttons.

Figure 64 – String constant to select and register

6. Fix sized variable

It is available only in the body area of the frame and used to process data whose length is of a Byte. Check 'Assign Memory' to read data from PLC memory when

send frame is registered and save the received data on PLC Memory when receive frame is registered. Conversion and swap processing are available for the data when FEnet module reads data from PLC memory or saves data on PLC memory.

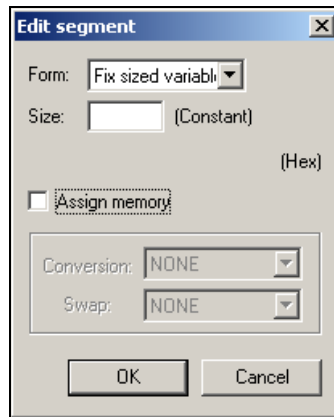


Figure 65 – Fix sized variable to select and register

7. Variable sized variable
 - a) Available in the body area of the frame.
 - b) Send Frame.
 - It is used for changing the length of the frame.
 - Select 'Assign Memory' to configure the send frame with the data read from PLC memory.
 - c) Receive Frame
 - It is used for processing the variable sized data among the received frames.
 - Registration is available only in the last segment in the Body area. Check 'Assign Memory' to save the data for the appropriate segment among the received frames. (Swap and conversion are available).

6. P2P Service

6.3. Setting P2P service

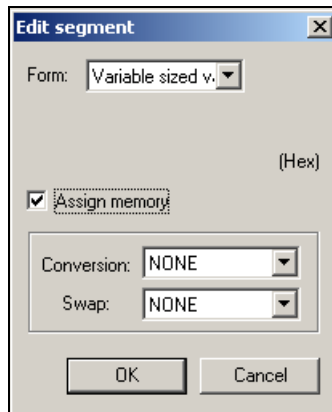


Figure 66 – Variable sized variable to select and register

8. Data conversion processing

In order to convert data from Hexadecimal to ASCII code, when frames are sent and received, or to execute Byte swap, appropriate setting should be specified on the frame edit window.

a) Conversion

- Hex To ASCII

Send: Converts read data from PLC memory to ASCII code to configure send frame.

Receive: Converts received data into ASCII to save.

- ASCII To Hex

Send: Converts read data from PLC memory to Hexadecimal code to configure send frame.

Receive: Converts received ASCII code data to Hexadecimal code to save.

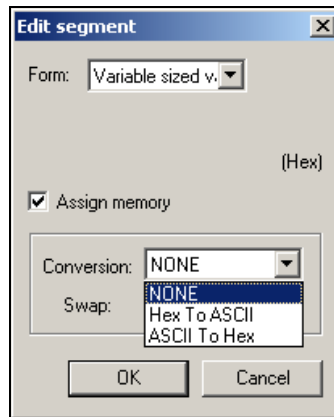


Figure 67 – Data processing method to select

If two words of PLC memory, MW100/101 are used for Send frame configuration, and the ASCII code 0x34353637 is saved on MW100/101, the applicable segment of the send frame will be filled with hexadecimal number '4567', when 'Hex To ASCII' is selected.

When some of the received frames are saved and converted to Hex, if the value of applicable area is '4567', 0x3435 3637 will be saved on PLC memory.

b) SWAP

Two bytes: Two bytes swap applicable part among Send/Receive frames.

Four bytes: Four bytes swap applicable part among Send/Receive frames.

Eight bytes: Eight bytes swap applicable part among Send/Receive frames.

If 0x1234567811223344 is converted by respective methods above, its results are as follows:

Two bytes swap: 0x3412785622114433

Four bytes swap: 7856341244332211

Eight bytes swap: 4433221178563412

6. P2P Service

6.3. Setting P2P service

P2P block

If P2P block is selected on the P2P menu, P2P parameter setting window displays.

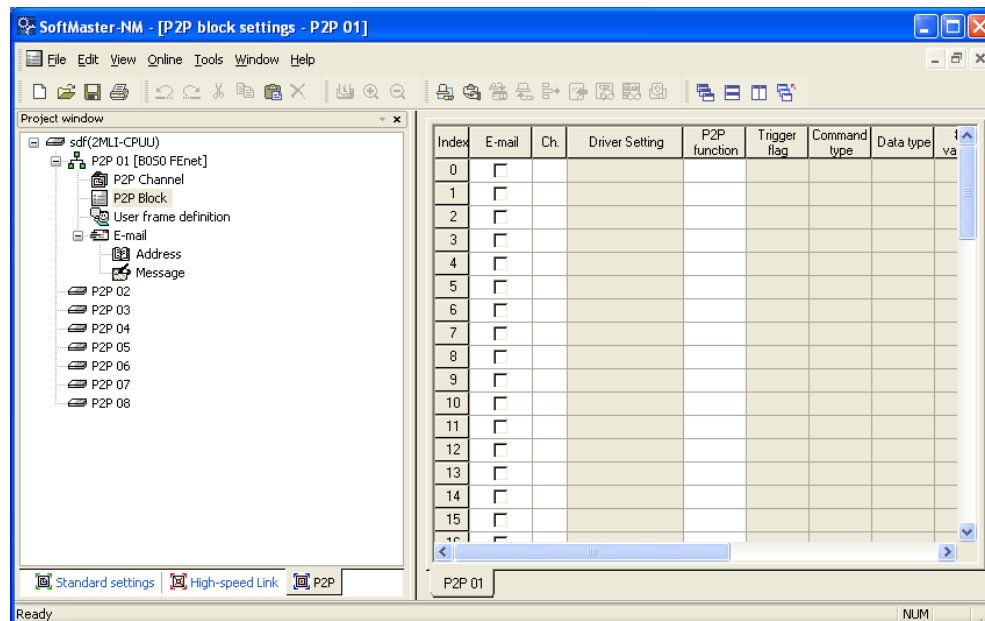


Figure 68 – P2P block setting

Up to 64 separate blocks can be set. Select an optional block to specify the respective block operation by selecting a function:

Setting items and details of respective functions are as follows:

1. Read

It reads the data from Read area in the station assigned in the P2P channel and saves the data in the Save area of self-station, which is commonly used for MLDP client and Modbus TCP client drivers. The basic configuration is shown below:

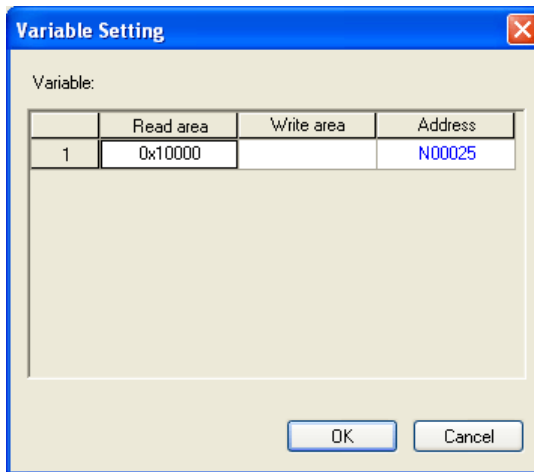


Figure 69 – Read command setting

It is composed of standard operation settings and memory settings as described below:

2. Standard operation setting

a) Channel

Select a communication port that is used by the applicable block. The communication port for each block is decided when P2P Channel is setup, which cannot be changed during Run.

b) Condition flag

Define the condition to operate the P2P block. A bit device is available for condition flag and the P2P block is operated at the rising edge of the condition flag.

c) Command type

Decide details of Read operation. Single and Continuous are available for Command Type. A maximum of four memory areas are available for Single Read function and Continuous Read reads as many bytes as defined on the 'Data Size' item.

d) Data type

6. P2P Service

6.3. Setting P2P service

Define the format of the data that the block will process. Bit, Byte, two bytes (Word), four bytes (Double Word) and eight bytes (Long Word) data can be processed in Single read function and BYTE is available only for Continuous read function.

- e) Number of variables

It is activated when 'Single' is selected in the 'Command' field. Decide the number of areas to read. A maximum of four are available.

- f) Data size

It is activated when 'Continuous' is selected in the 'Command' field. Since BYTE is fixed in the data type when MLDP Client driver is used, Data Size can be assigned in BYTE size.

3. Memory settings

- a) Read area

- b) Set the memory area of counterpart station to read. The P, M, K, F, T, C, U, Z, L, N, D, R, ZR areas are available when MLDP client is selected for Driver that is assigned in the P2P Channel settings. Refer to the CPU manual for the available ranges of each memory area.

- c) Set as many variables as assigned in the 'Number of variables' for Single Read and the header address for Continuous Read. The format of address must be different based on driver types.

- d) MLDP client

- e) Input M100 to read data of counterpart's M100 word address.

- f) Modbus TCP client

- g) Input 30010 to read data of counterpart's Analog Input (AI) 10 address.

- h) Save area

- Set the area on which the read data is to be saved.
- Set as many variables as assigned in the 'Number of variables' for Single Read and the header address for Continuous Read.
- Input P100 to save the read data on P100 word address. For example, in order to read %MB100's 100 bytes of the corresponding IP

(165.244.149.244) station and to save on my PLC %M0 via the channel 0 when Timer T0000 turns ON.

- Its setting is as follows:

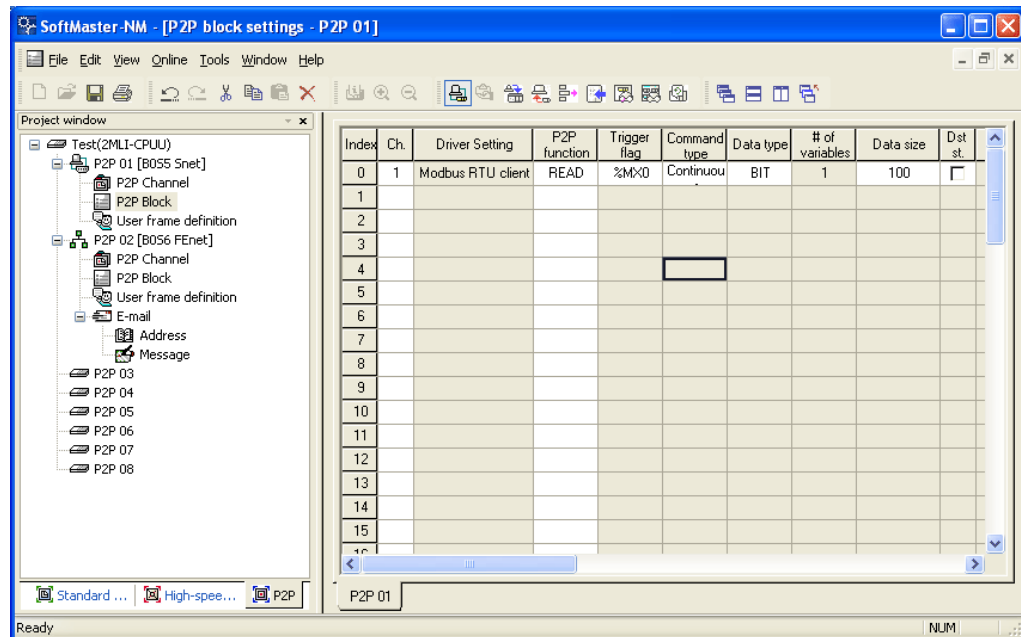


Figure 70 – Read command setting complete

4. Write

It is used for writing data on optional destination station's area desired, commonly for MLDP client and Modbus TCP client drivers. It supports Continuous Write and Single Write, where data can be written on up to four individual areas.

Its basic configuration is as shown below:

6. P2P Service

6.3. Setting P2P service

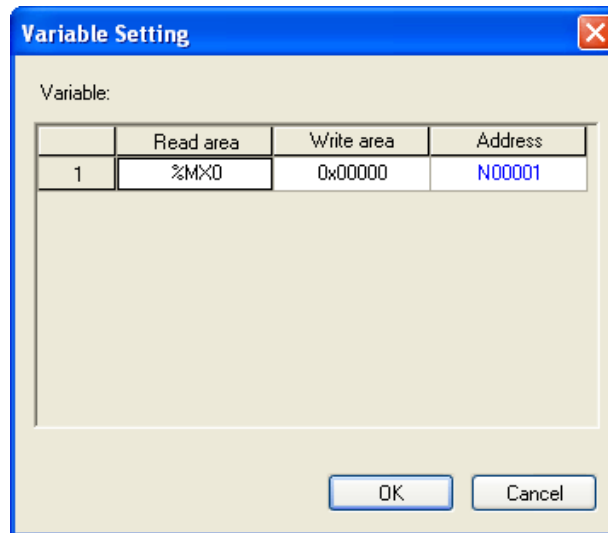


Figure 71 – Write command setting



ATTENTION

Ensure that the memory address range configured for P2P is within the synchronization address range in redundancy parameter.

Details of respective input items are as described below:

a) Basic operation setting

- Channel

Select a communication port that will be used by the applicable block. The communication port for each block is decided while setting parameters, which cannot be changed during Run.

- Condition flag

Define the condition to operate P2P block. A bit device is available for condition flag and the P2P block will be operated at the rising edge of the condition flag.

- Command type

Decide detailed write operation. Single Write and Continuous Write are

available. Single Write writes up to four memory areas and Continuous Write writes as many bytes as defined on the specified position.

- Data type

It defines the format of the data the block will process. Bit, Byte, two bytes (Word), four bytes (Double Word) and eight bytes (Long Word) data can be processed in MasterLogic-200.

- Number of variables

It is activated when 'Single' is selected in the 'Command' field. Decide the number of areas to write on individually. A maximum of four are available.

- Data size

It is activated when 'Single' is selected in the 'Command' field. Since BYTE is fixed in the data type when MLDP Client driver is used, data size can be assigned in BYTE size.

- Destination station number: Not used in FEnet I/F module.

b) 2MLI and 2MLK setting

Select the CPU type whose selection choices are 2MLK and 2MLI.

c) Memory setting

- Read area. Set the self-station memory area where the sent data is saved.
- Set as many variables as assigned in the 'number of variables' for Single Write and the header address for Continuous Write. The format of address must be different based on driver types.
- MLDP client
- Input M100 to read data of corresponding %MW100.
- Modbus TCP client
- Input 30010 to read data of corresponding AI 10 address.
- Save area
 - Set the area on which the read data is to be saved.

6. P2P Service

6.3. Setting P2P service

- Set as many variables with input value that will be different based on driver types.
- Input P100 to save the read data on %PW100.

In order to write MW0 data of 10 Words of My PLC on the corresponding area A0 via the channel 1 (165.244.149.244, port 502), its example is as follows:

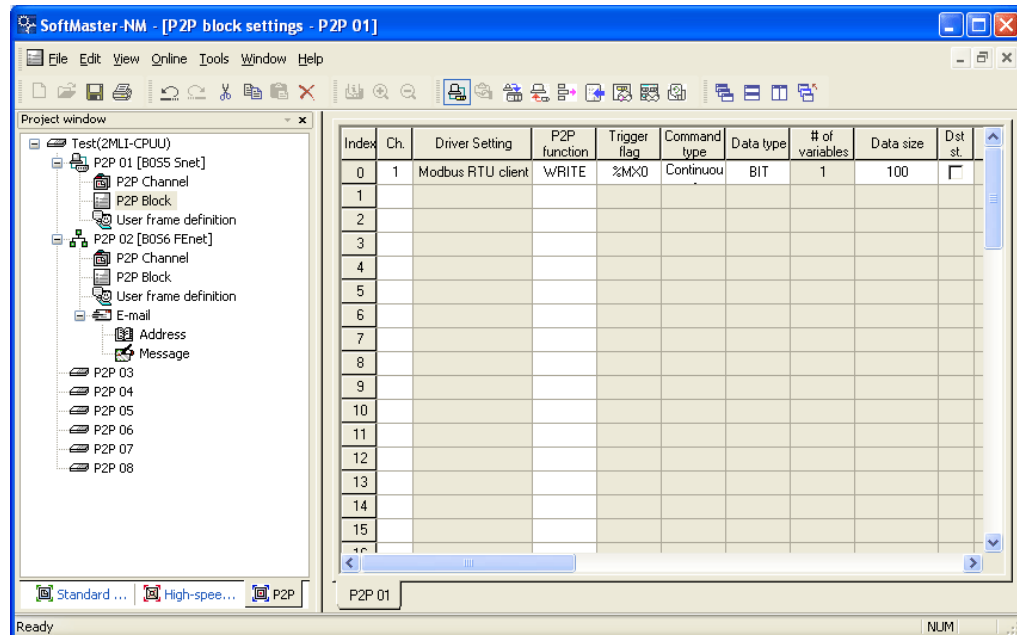


Figure 72 – Write command setting complete

5. Send

This function is used for sending the optional frame to an external device to connect not through MLDP client/Modbus TCP client protocol but unspecific communication method.

Only one frame may be selected to use for each frame Send function, and memory setting will be specified in this function for applicable frame's Fix sized /Variable sized variable. The frame selected for Send function should be surely specified before the function is used.

6. P2P Service

6.3. Setting P2P service

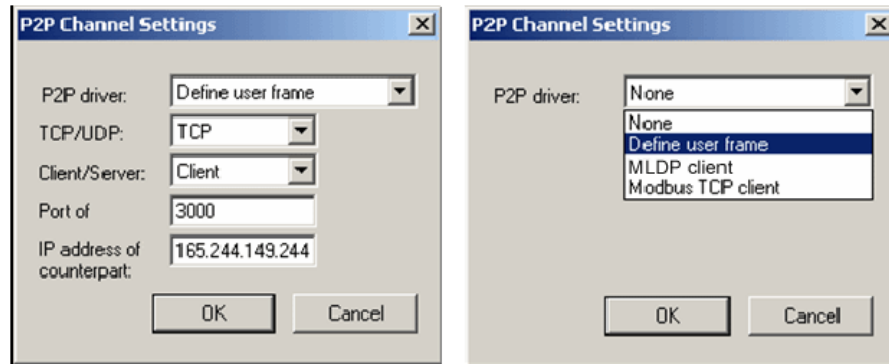


Figure 73 – Send command driver setting

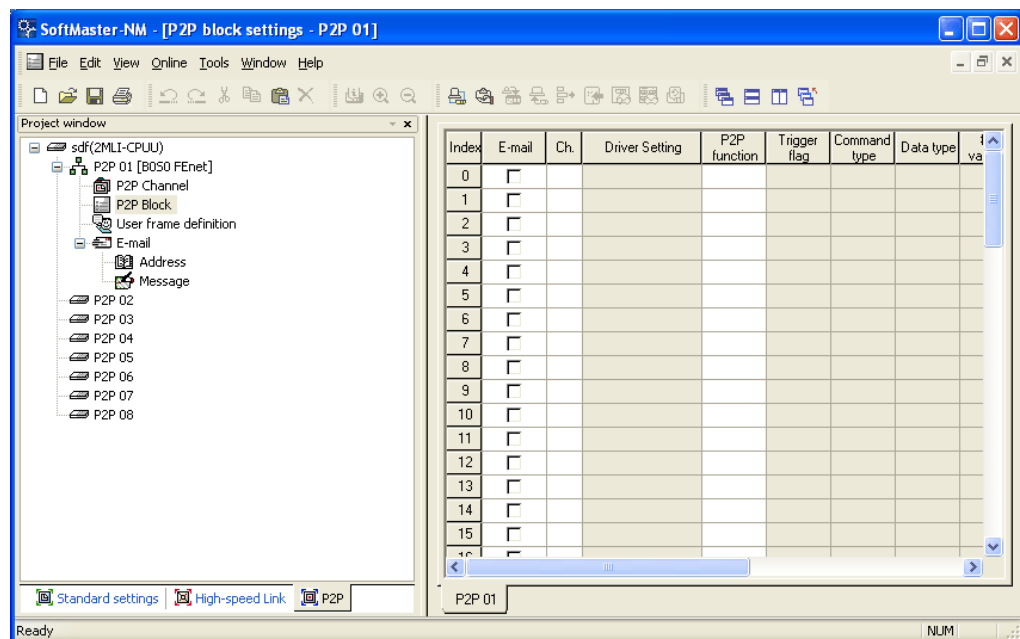


Figure 74 – P2P parameters setting

6. P2P Service

6.3. Setting P2P service

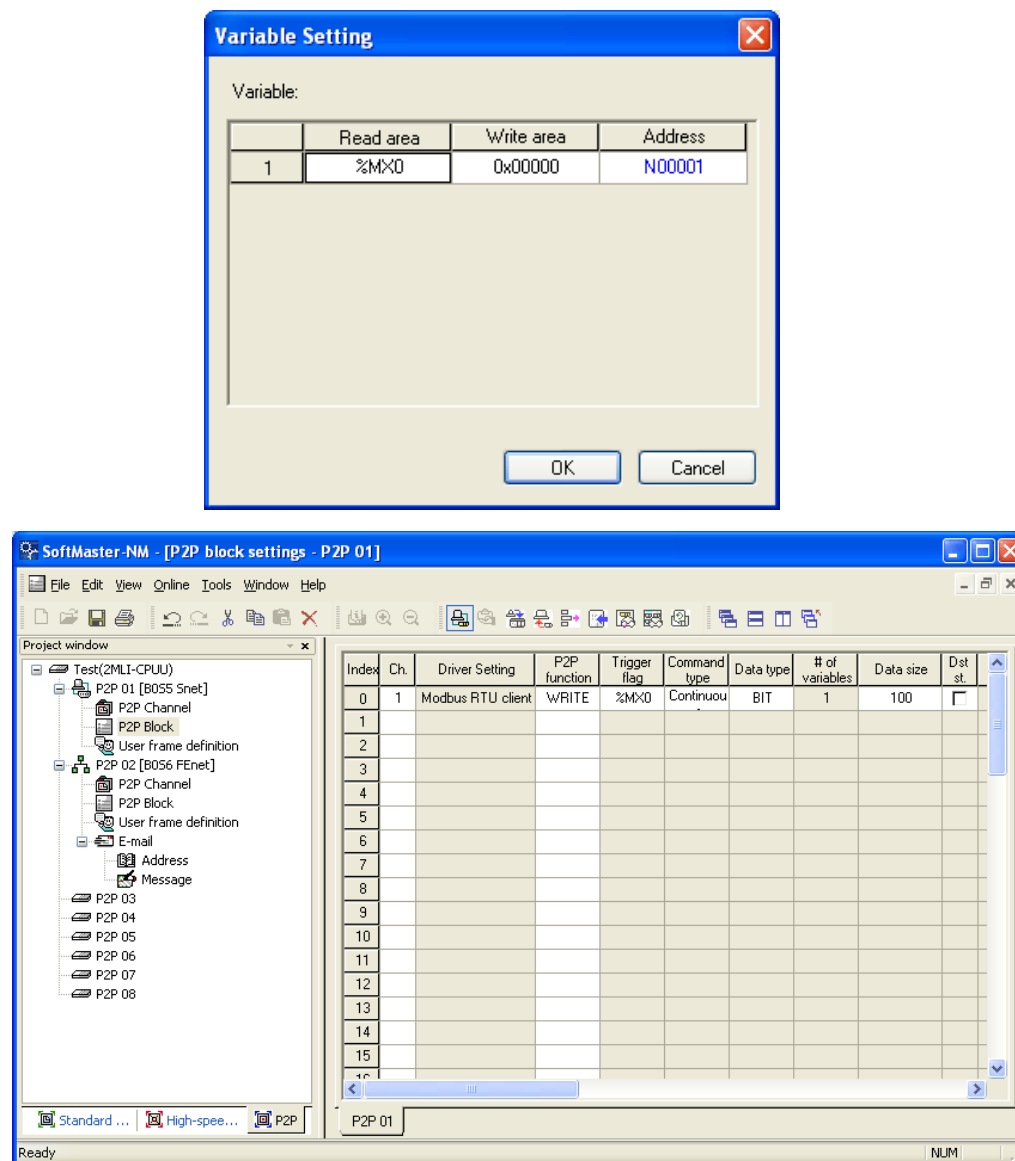


Figure 75 – Write command setting complete

Details of respective items above are described below:

1. Basic setting item

a) Channel

Select a channel to send the desired frame through (IP: 165.244.149.244, D_PORT: 3000).

b) Condition flag

Define when the frame is to be sent.

c) Frame

Select the name of the user-defined frame to be used in applicable P2P block. Frame should be defined prior to function registration. Selection available among the frames registered as frames to send.

2. Variables

a) Read area

- Specify the data position to configure the frame as information for the variable area inside Send frame.
- Input Word address. If the variable area of the frame is configured by reading data from %DW200, then input D200.
- Define as many variables inside the frame.

b) Size

Set the size of data to be in the variable area inside Send frame selected. It may be defined as many variables.

3. Receive

This function is used for receiving some frames from the destination station. An identical frame cannot be selected for respective P2P Frame Receive function blocks. Only one Receive function block can be decided for the received frame.

6. P2P Service

6.3. Setting P2P service

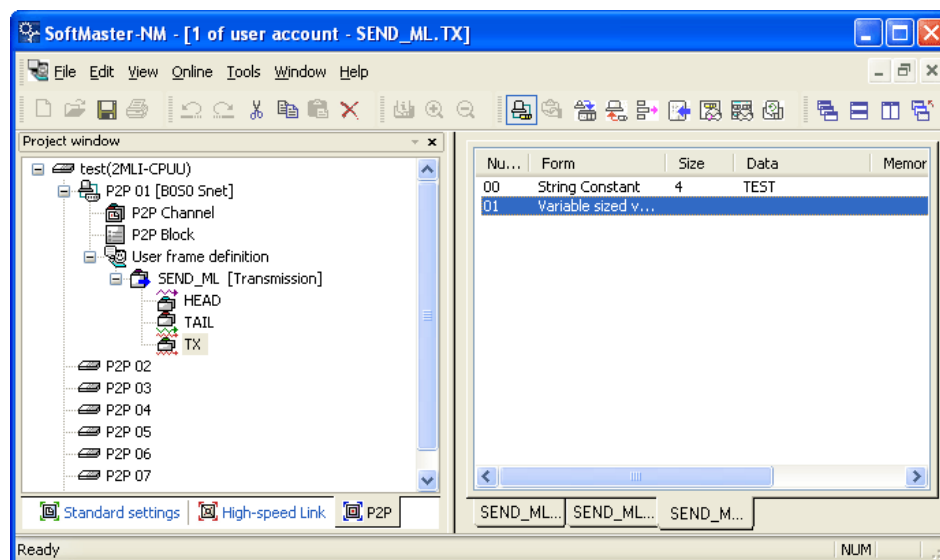


Figure 76 – Receive command setting window

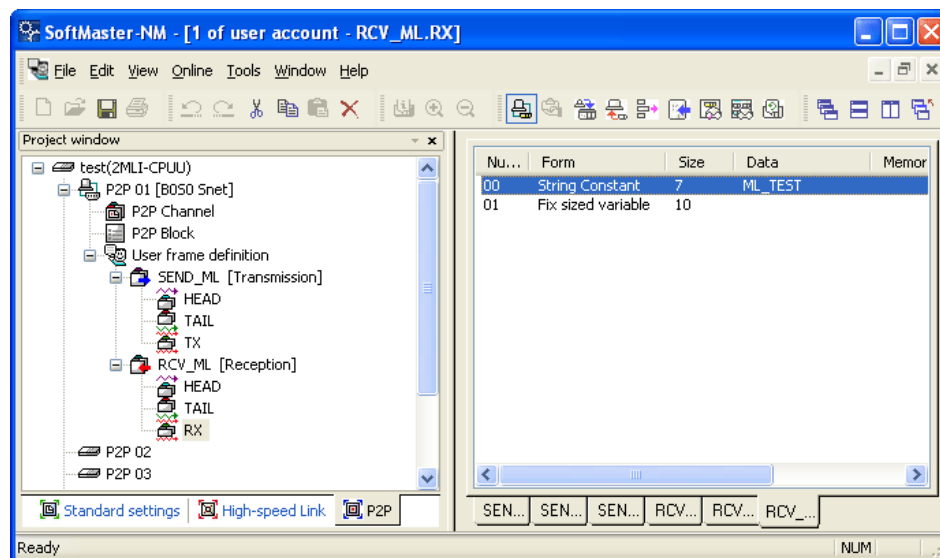


Figure 77 – P2P block register of Receive command

4. Basic setting item
 - a) Channel: Select a channel to receive the desired frame. (IP: 165.244.149.244, D_PORT: 3000)
 - b) Frame: Select the received user-defined frame.
5. Memory setting item
 - a) Save area
 - If registered frame is received, specify the position to save data for variable-defined segment.
 - Define many variables inside the received frames.
6. Esend/EReceive

This service is used to send/receive e-mails to/from the user for the error value caused by events without disturbing the communication operations.

6. P2P Service

6.4. P2P service operation

6.4 P2P service operation

After P2P parameters are specified, download the parameters onto PLC's CPU and start the P2P service. It is assumed that P2P parameters are already prepared for download and connection is available with the applicable PLC's CPU.

1. P2P parameters downloading

In order to download the prepared P2P parameters, from the **Online** menu, select **Write Parameter** on SoftMaster-NM window to display the parameters downloading window, where registered basic setting, P2P parameters and HS link parameters can be selected.

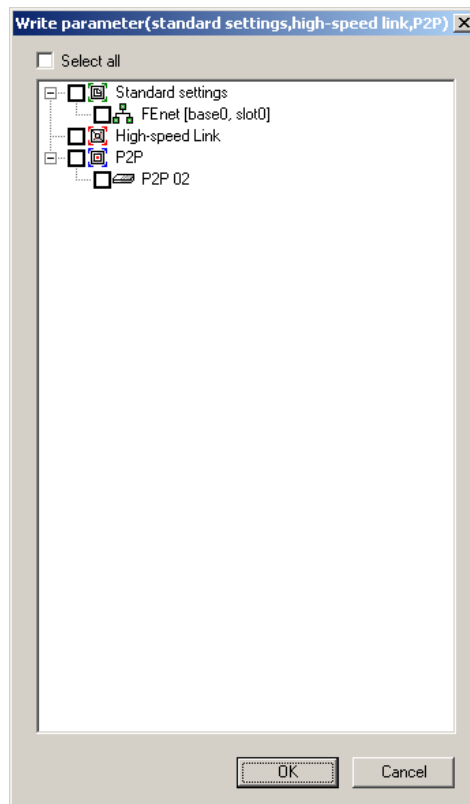


Figure 78 – P2P parameters downloading

Among P2P 0–7, only the prepared P2P parameters displays after sorting, where P2P parameters download is selected.

Click **OK** to download the P2P parameters onto CPU.

2. P2P service start

Even after P2P parameters are downloaded, P2P may be started in order to start the P2P service. From the **Online** menu, select **Link Enable** (HS link, P2P).

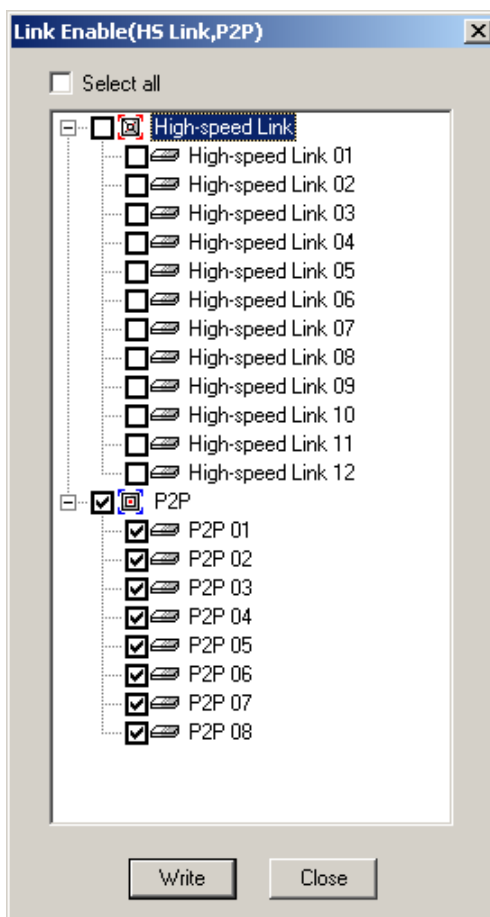


Figure 79 – Enable setting of P2P service

6. P2P Service

6.4. P2P service operation

On the **Link Enable** (HS link, P2P) window, select P2P parameters to start. The P2P parameters are selected during run, the P2P services deselected will stop.

In order to confirm normal downloading and normal P2P service operation, select **System Diagnosis** on the menu.

6.5 P2P diagnosis function

Diagnosis function of P2P system is used for displaying the service status and information of the communication program after the driver of the communication module is specified. You can check the normal P2P service through the diagnosis system.



REFERENCE - INTERNAL

For more details, refer to SoftMaster-NM Program.

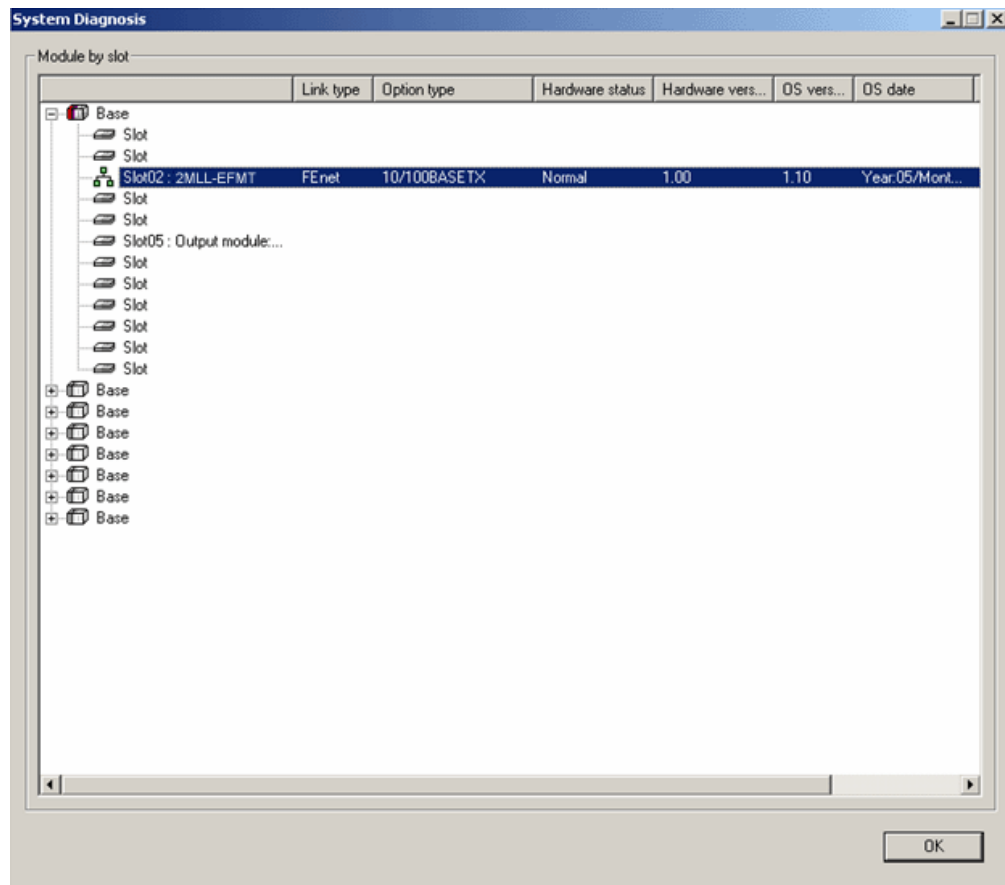


Figure 80 – Information of system diagnosis module

6. P2P Service

6.5. P2P diagnosis function

1. P2P service

It is used for displaying detailed information on the executed user-defined service. It checks and reads the service status if P2P parameters are set and enabled. The real-time monitoring is available with Individual Read or Continuous Read as specified on the menu.

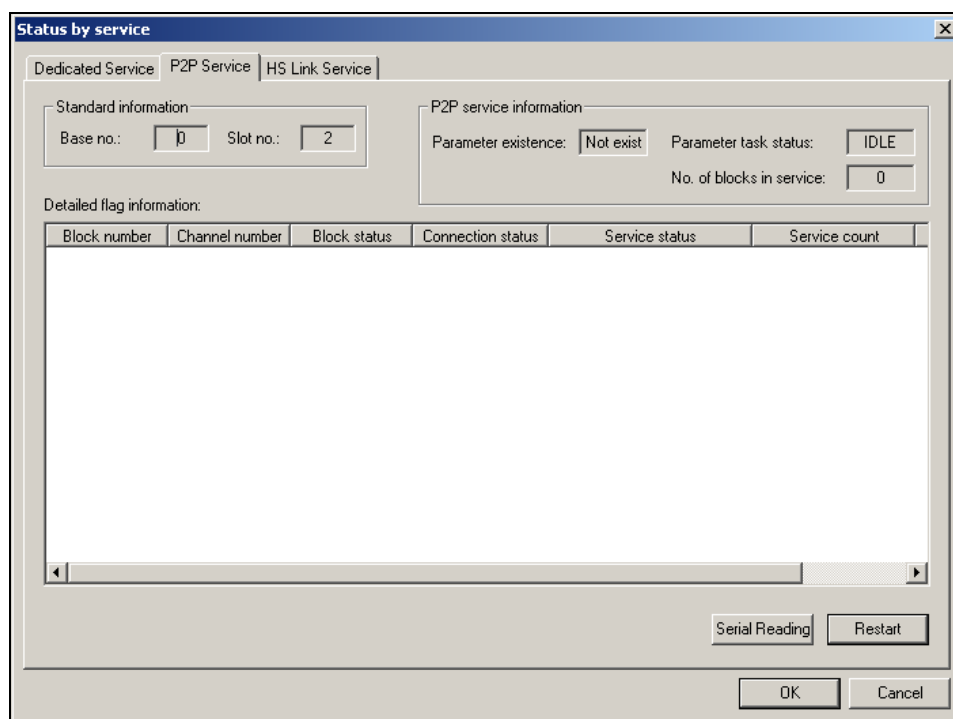


Figure 81 – P2P service monitor

7. Dedicated Protocol Communication

7.1 Modbus/TCP dedicated server

The dedicated communication service is a setting for the Experion SCADA integration. This is used when FEnet I/F Module operates as the master of other device or higher PC (MMI) Modbus.

Driver setting

The image shows a 'Standard Settings' dialog box with three main sections: TCP/IP settings, Host table settings, and Driver(server) settings. The TCP/IP settings section includes fields for HS link Station # (1), Media (AUTO(TP/CAT5)), IP address (10.1.18.194), Subnet mask (255.255.255.0), Gateway (10.1.18.1), DNS server (0.0.0.1), a checkbox for DHCP, Reception waiting time (15 sec), and # of Dedicated Connections (3). The Host table settings section has a checkbox for 'Enable host table' and a table with one row and one column labeled 'IP address'. The Driver(server) settings section has a dropdown menu for 'Driver' with 'Modbus TCP/IP server' selected. The dialog box has 'OK' and 'Cancel' buttons at the bottom right.

Host table settings	
	IP address
1	

Figure 82 – Modbus TCP driver setting

7. Dedicated Protocol Communication

7.1. Modbus/TCP dedicated server

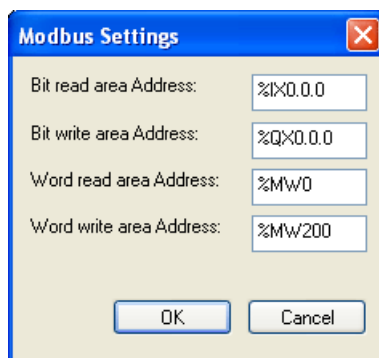


Figure 83 – Modbus TCP address

Modbus function and the maximum number of response data supported by Modbus TCP driver are described in the table below. The corresponding master device will make a request within the range specified in the table.

For example, Bit Read Request is available up to 2000 bits, and Bit Write Request is up to 1600 bits.

Table 30 – Response data by Modbus TCP driver

Code	Description	Address	Response Size
01	Read Coil Status	0XXXX	2000 Coils
02	Read Input Status	1XXXX	2000 Coils
03	Read Holding Registers	4XXXX	125 Registers
04	Read Input Registers	3XXXX	125 Registers
05	Force Single Coil	0XXXX	1 Coil
06	Preset Single Register	4XXXX	1 Register
15	Force Multiple Coils	0XXXX	1600 Coils
16	Preset Multiple Registers	4XXXX	100 Registers

Mapping of MasterLogic-200 PLC memory is required for each function code's request.

Respective setting details are as follows:

Table 31 – Setting details of function code

Item	Description	Remarks
DI area address	MasterLogic-200 address respective to digital input area	Bit address
DO area address	MasterLogic-200 address respective to digital output area	Bit address
AI area address	MasterLogic-200 address respective to analog input area	Word address
AO area address	MasterLogic-200 address respective to digital output area	Word address

The address value specified in each item is the base address of the applicable area.

[Figure 83](#) shows that DI area is assigned starting from PX0000 and that AO area is assigned starting from PW300.

The input value of the base address will be within the effective areas of % M, P, and so on. Since Modbus address is 1 – 9999 (decimal), the size of the bit I/O area will be $9999/8 = 1249.875$ bytes. In addition, the size of the word I/O area will be $9999*2 = 19998$ bytes.

If the user sets the base address of the bit output (HXXXX) area to 0, Modbus bit area 00001 will be correspond to 0th byte, 0th bit, and 00002 to 0th byte, 1st bit.

7. Dedicated Protocol Communication

7.1. Modbus/TCP dedicated server

8. Remote Connection Service

8.1 Introduction to remote connection service

This function is used for programming; downloading of user program, program debugging, monitoring, and so on, in a network system. PLCs are connected with each other via Ethernet by remote control without any changes to the physical connection status of SoftMaster or SoftMaster-NM. It is especially convenient for easy access to each device from a place without repositioning when network-connected devices are separated far from one another. SoftMaster or SoftMaster-NM remote connection service is available under the following Logical Path to attain its purpose.

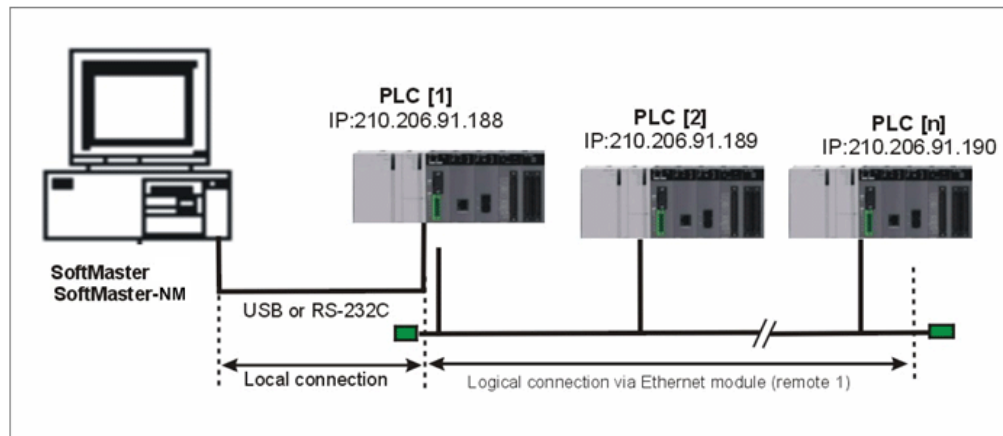


Figure 84 – Ethernet network

A network is developed when RS-232C cable is connected between PC and PLC on which SoftMaster and SoftMaster-NM are installed. In addition, PLC #1 station, PLC #1, PLC #2 and PLC #n is connected with each other via Ethernet in SoftMaster-NM as shown in [Figure 84](#).

To access the contents of PLC #1 station in the figure above, Local connection is required in SoftMaster-NM's **Online** menu. After you finish accessing the contents of PLC #1, disconnect the Local connection with 'Disconnect' menu.

Select PLC #n for accessing PLC #n station:

In the remote connection dialogue box, set the IP address of PLC #n, base and slot number where FEnet module is installed in the PLC #1 station. A logical connection between SoftMaster-NM and PLC #n will be established via RS-232C and Ethernet. This

8. Remote Connection Service

8.1. Introduction to remote connection service

status is identical to the status of RS-232C cable connected between PC and PLC #n station. This connection makes it possible to execute all functions of programming, downloading, debugging and monitoring as in PLC #1.

In addition, if Ethernet module (LAN Card) is installed on PC where SoftMaster-NM is installed and connected to the identical network to PLC, remote stage 1 connection with PLC is available via Ethernet without local connection via RS-232C.

With the remote connection service of SoftMaster and SoftMaster-NM, easy access to PLC is possible at a far place also. Moreover, reprogramming without repositioning the PLC is possible when PLC is located at a place hard to reach.

8.2 Setting and connection

All PLCs connected via MasterLogic-200 network are available to connect with each other by remote connection service. SoftMaster-NM remote connection is composed of stage 1 and stage 2 connections as described below:

The followings figure explains remote 1 and remote 2 connections. It also shows an example of network system composed of two networks.

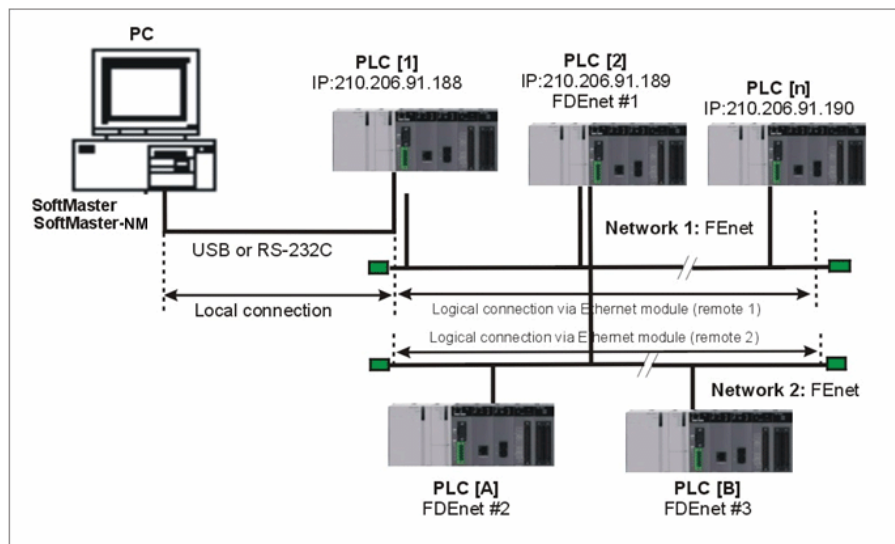


Figure 85 – Remote connection

Remote 1 connection (If RS-232C cable used)

For remote stage 1 connection, SoftMaster-NM will be in off-line state.

Select **Connection Settings** option from the **Online** menu as shown in [Figure 86](#), **Online Settings** dialog box displays as shown in [Figure 87](#).

8. Remote Connection Service

8.2. Setting and connection

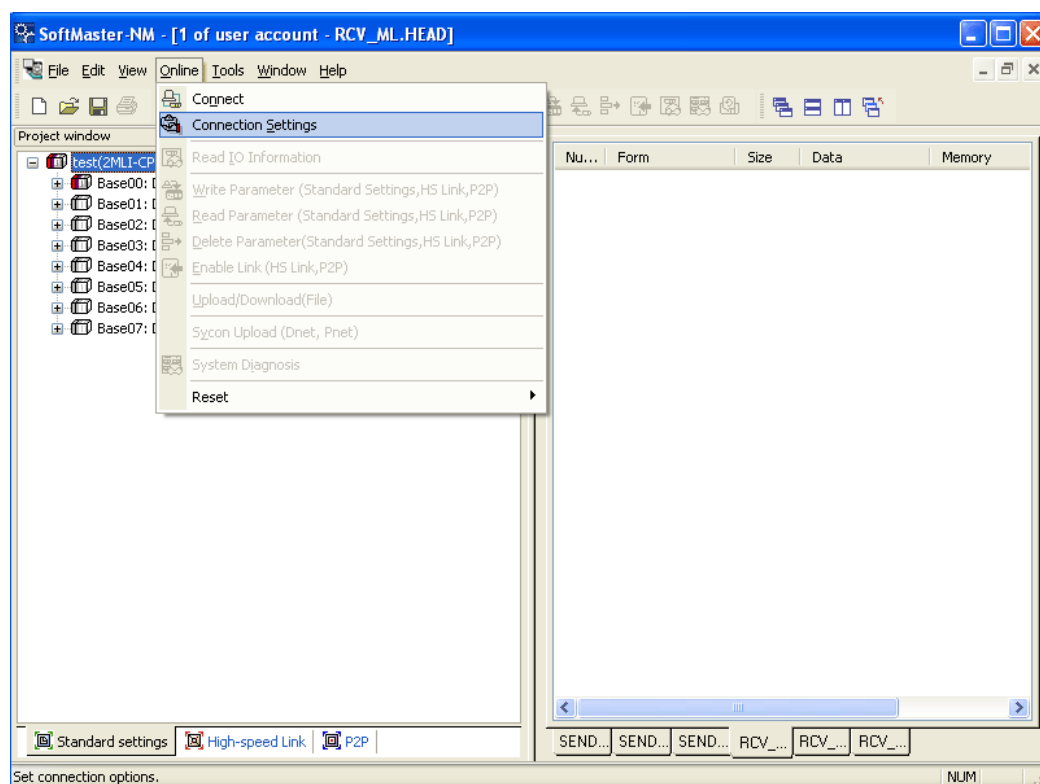


Figure 86 – SoftMaster-NM remote connection option to select

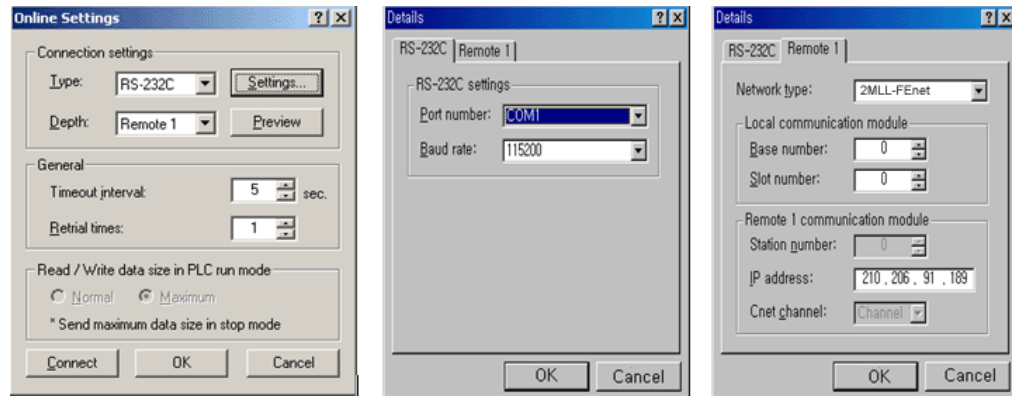


Figure 87 – SoftMaster-NM remote stage 1 connection

1. Connection type

It designates the connecting method for local connection. Local connection is established with RS-232C as shown in [Figure 85](#). Select the COM port used in the PC for port number. Refer to user's manual of each communication module for the case with other connection types.

2. Connection depth

Decide a PLC connection stage of local, remote stage 1 or 2. Here, select remote stage 1.

3. Network type

Select a network type for stage 1 connection among Rnet, Fdnet, Snet, FEnet and FDEnet. Select Ethernet because stage 1 connection is established through FEnet as shown in [Figure 85](#).

4. Base number

Specify the base number where the remote FEnet I/F module is installed.

5. Slot

It indicates the slot number where FEnet module is installed in locally connected PLC via RS-232C. Select number 0 as shown in [Figure 87](#), since FEnet installed on PLC 1 is on slot number 0.

8. Remote Connection Service

8.2. Setting and connection

6. IP address

Specify the IP address of FEnet I/F module installed in the PLC that is connected with SoftMaster-NM in the network 1. Use the IP address of FEnet module installed in PLC #2 station, 210.206.91.189 as shown in [Figure 87](#).

Click **OK** and then select **Connect** from the **Online** menu.

The completed Stage 1 connection status is the logical connection status identical to the local connection with RS-232C cable connected to the PLC. All the Online menu options are available. (Except that CPU type between PLC and currently open project are not the same).



ATTENTION

Precautions for remote connection:

- Prepare a suitable program for corresponding CPU type to connect remotely.
 - If the CPU type is not compatible between the two, only limited functions will be allowed.
 - Program uploading/downloading and monitoring are not available in such cases.
-

Remote 2 connection (RS-232C cable is used for local connection)

Select '**Connection Settings**' from the Online menu and setup each item of Local, Remote1 and Remote 2 settings as shown in [Figure 88](#). The [Figure 85](#) shows a connection setting example to connect PLC [B] with remote 2 stages, where remote 1 is FEnet and remote 2 is FDEnet.

On the **Online Settings** dialog box, select RS-232C for **Type** and Remote 2 for **Depth** and click **Settings**

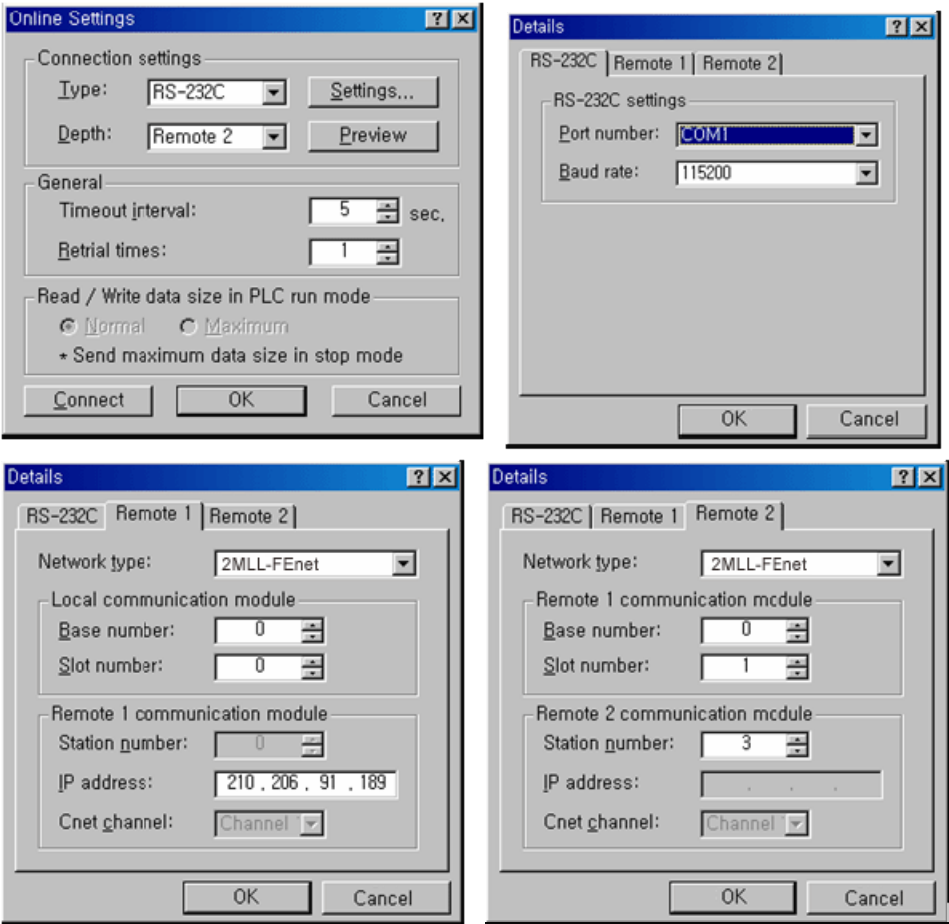


Figure 88 – SoftMaster-NM remote stage 2 connection

8. Remote Connection Service

8.2. Setting and connection

Remote 2 is described below:

1. Setting of network type

Select a network type for remote stage 2 connection among MasterLogic-200 Rnet, Fdnet, Snet, FEnet, and FDEnet. Network types of stage 1 and stage 2 connections bear no relation to each other. 2MLL-FDEnet is to be selected since stage 2 connection is with FDEnet as shown in [Figure 85](#).

2. Station number of Remote 2 communication module

Use the station number of the module installed in PLC that will be connected with stage 2 in the network for remote stage 2. In the case of [Figure 86](#), use 3 as the station number of remote 2 communication module, since the connection will be established between PC and PLC [B] whose FDEnet module has the station number 3.

3. Base and slot number of Remote 1 communication module

Set the base and slot number, where FDEnet module is installed in the PLC[2]. It is connected with stage 1 in the network 1.

Stage 2 connection is the logical connection status identical to the connection with RS-232C cable. It establishes connection to PLC [B], where all the Online menu options are available.

Remote 1 connection directly from PC connected with Ethernet

Remote stage 1 connection via Ethernet without connecting RS-232C cable is available if a PC (where SoftMaster and SoftMaster-NM is installed) is part of the PLC Ethernet network.

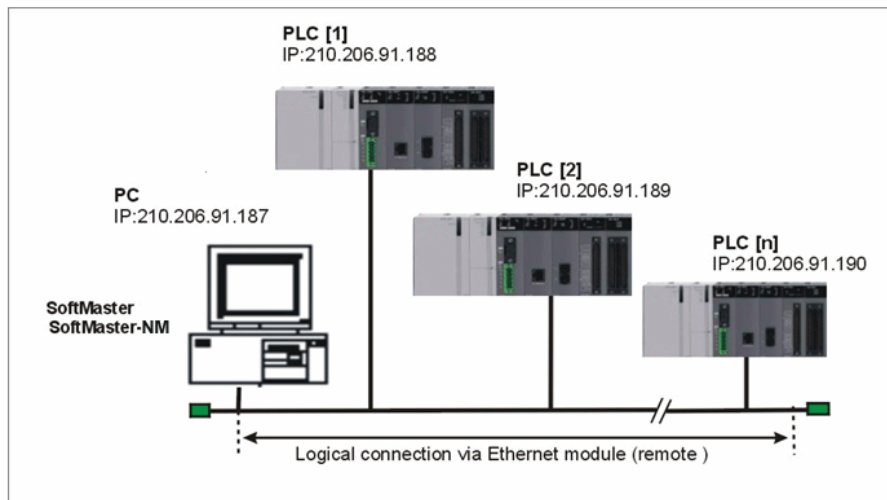


Figure 89 – Remote stage 1 connection system through PC

[Figure 89](#) shows the connection between PC and PLC via Ethernet, where connection to all PLCs on the network is available without RS-232C used in SoftMaster or SoftMaster-NM. In this case, local connection is omissible and remote 1 connection is available with all PLCs.

Select **Connection settings** from the **Online** menu and change the setting in the dialog box as specified below to establish remote stage 1 connection directly via Ethernet.

8. Remote Connection Service

8.2. Setting and connection

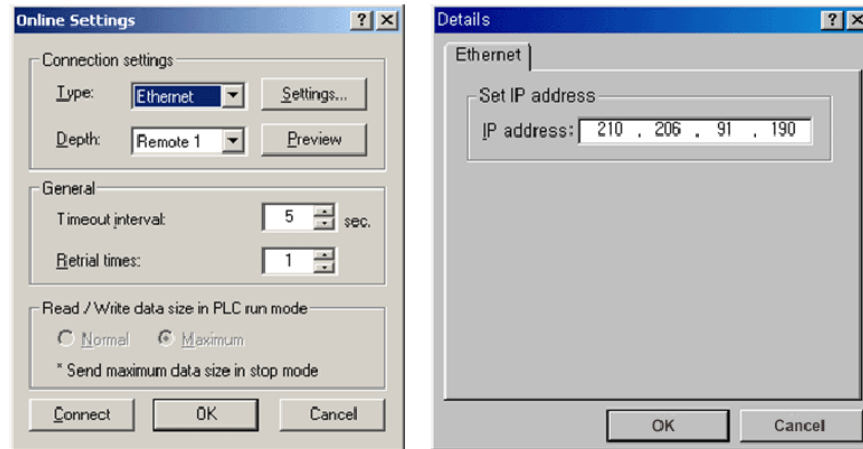


Figure 90 – Remote 1 connection directly via Ethernet

1. Connection type

Select an applicable type for connection. In [Figure 90](#), select Ethernet because the connection is established directly via Ethernet without RS-232C application.

2. Connection depth

Decide a PLC connection stage of remote stage 1 or 2. Select remote 1.

3. IP address

Set the IP address of FEnet I/F module to connect to use IP address, 210.206.91.190, to connect to PLC [n] as in [Figure 89](#).

The rest of the procedures are the same as in RS-232C used.

Click **OK** and then select **Connect** from the **Online** menu.

Remote 2 connection directly from PC connected with Ethernet

Remote stage 2, connection is available via Ethernet if a PC where SoftMaster-NM is installed is included in PLC Ethernet network as shown in [Figure 91](#). The procedures are the same as in remote 1 connection and a setting example of 'Connection Setting' is as shown in [Figure 92](#).

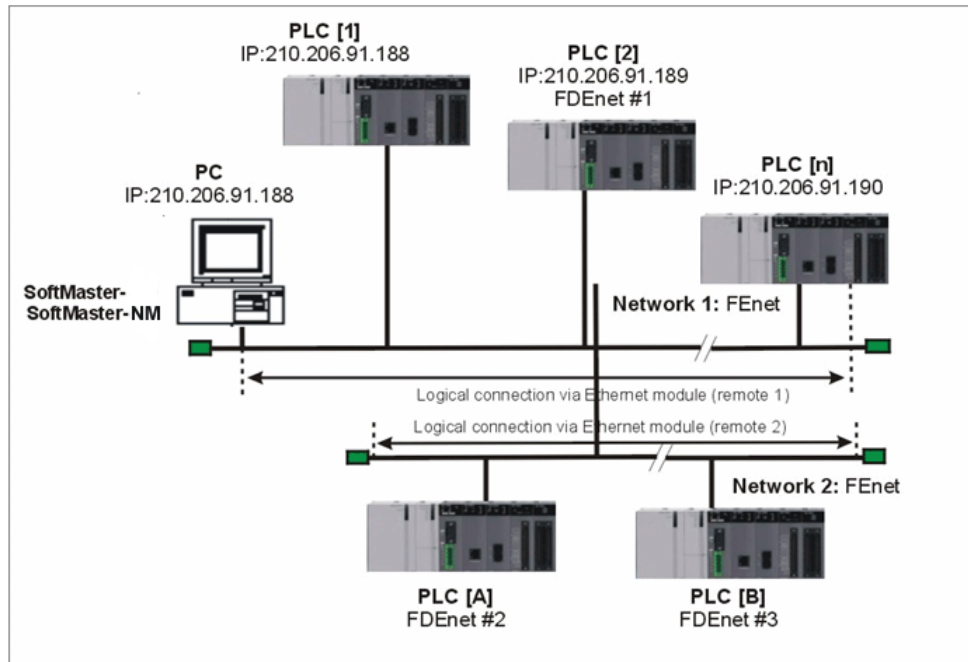


Figure 91 – Remote stage 2-network system

8. Remote Connection Service

8.2. Setting and connection

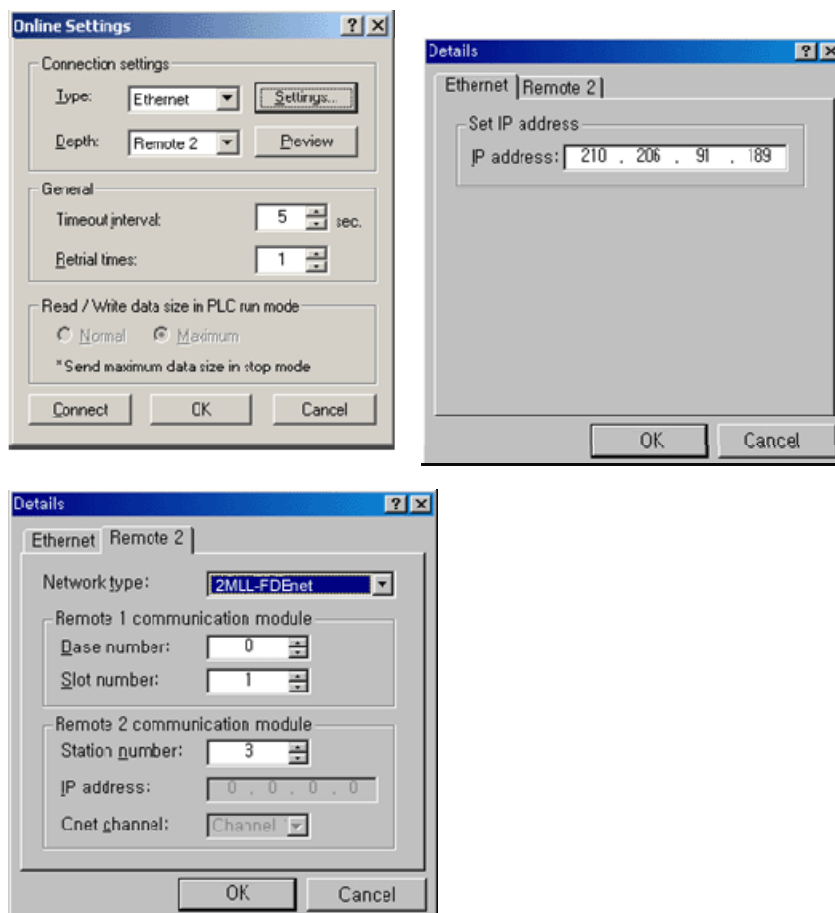


Figure 92 – Remote 2 connection directly via Ethernet



ATTENTION

Precautions while operating with remote stage 1 and 2 connections.

1. The following menus are not available if the types between the project currently open in SoftMaster-NM and the CPU connected with stage 1 or 2 are not identical.
 - a) Write program and each parameter.
 - b) Read program and each parameter.
 - c) Monitor
 - d) Flash memory
 - e) Set Link Enable
 - f) I/O information
 - g) Compulsory I/O information
 - h) I/O SKIP
 2. Execute the remote connection with the applicable project of the station. Connect to SoftMaster-NM programming through remote stage 1 and 2 connections.
 3. Up to only two stages are available for the remote connection.
-

8. Remote Connection Service

8.2. Setting and connection

9. Troubleshooting

9.1 Introduction to troubleshooting

This chapter describes various errors that may occur in system operation, their causes and possible actions. Follow the procedures below to check for errors and error details in MasterLogic-200 FEnet I/F module. Using proper procedures, take suitable actions against the abnormal module states through the troubleshooting. Discretionary repair or disassembly is not allowed.

9.2 Checking through communication module LED

You can check the status of the communication module through the LED display.

Displaying abnormal operation

You can check the operation status through LED in front of Ethernet module.

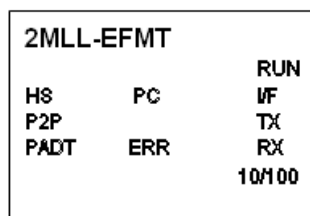


Figure 93 – LED structure of FEnet I/F module

The following table describes LED functions.

Table 32 – LED functions

LED	Error	Action
RUN	Turned off after FEnet module is powered on	<ul style="list-style-type: none">Ethernet communication module incorrectly installed<ul style="list-style-type: none">Check DC 5V power supply of power module.Check if the communication module is correctly installed on the base.Check if communication module is correctly perceived with SoftMaster-NM.

9. Troubleshooting

9.2. Checking through communication module LED

LED	Error	Action
I/F	LED on or off during normal communication	<ul style="list-style-type: none">• Check the operation state of CPU module.• Check if the communication module is correctly installed on the base.• Check if module information is correctly perceived with SoftMaster software.
P2P	Turned off during P2P command service	<ul style="list-style-type: none">• Check if the basic parameter is downloaded correctly.• Check if the function block/command is edited correctly.• Check if the media is connected correctly.• Check if 'Link Enable' is enabled.
HS	Turned off during HS link service	<ul style="list-style-type: none">• Check if the basic parameter is downloaded correctly.• Check if HS link setting is correct.• Check if 'Link Enable' is enabled.
PADT	Turned OFF during remote connection service	<ul style="list-style-type: none">• Check if IP address for remote (PADT) connection is normal.• Check if remote connection of PADT is disconnected.
PC	Turned OFF during dedicated service	<ul style="list-style-type: none">• Check if IP address for dedicated connection is correct.• Check if Host table is enabled.• If Host table is enabled, check if the IP address of HMI (PC) is registered in the host table.• Check if connection is requested from MMI (PC) device.
ERR	Turned ON during normal communication	<ul style="list-style-type: none">• Check if the basic parameter is downloaded correctly.• Check for any error in interface with CPU.
TX	Turned ON during transmitting data	<ul style="list-style-type: none">• Check if request frame is received normally from the client.

9. Troubleshooting

9.2. Checking through communication module LED

LED	Error	Action
RX	Turned ON during receiving data	<ul style="list-style-type: none">• Check for any error in receiving program.• Check for any error in frame edits.• Check if the media is connected correctly.
PHY	Turned OFF during normal communication	<ul style="list-style-type: none">• Check if the media is composed of 100Mbps (Auto-Negotiation).

9.3 Module check with SoftMaster

SoftMaster program can be used for monitoring the communication module. Establish connection between PLC and a PC in which SoftMaster is installed, and then from the **Online** menu, select **PLC History**, [PLC Error/Warning] in SoftMaster.

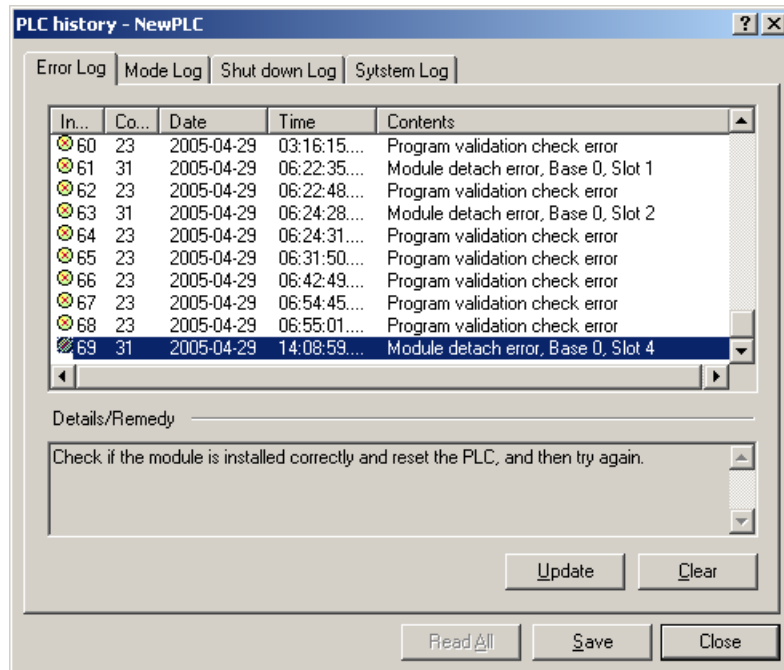


Figure 94 – PLC history

If a hardware error or a CPU interface error occurs on the module, LED of the communication module itself operates abnormally in general, whose status can be monitored simply through its dedicated program.

[Figure 94](#) shows error/warning information through PLC History on the SoftMaster Online menu, which can be settled by referring to [Details and Actions].

9.4 Module check through error codes

Identify the error codes of abnormal operations described in Table 49 for troubleshooting Table 50. Troubleshooting section describes error details and required actions to be taken.

Abnormal operations

Table 33 – H/W related error of communication module

Error Code	Error Display	Description
E00-01	ECM_12 – ECM_15	H/W self-diagnosis error.
E00-02	ECM_13, ECM_18	Interfacing error with CPU.

Table 34 – Interface operation abnormal with CPU of the communication module

Error Code	Error Display	Description
E02-01	ECM_18	Interface abnormal between FEnet I/F module and CPU.

Table 35 – Abnormal operation of HS link function

Error Code	Description	Cause
E03-01	HS link parameter setting error	After Online link is enabled, HS link parameters specified incorrectly, or not specified.
E03-02	HS link not executable	After link enabled with HS link parameters, normal communication is not available as desired.
E03-03	_HSxRLNK and _HSxTRX contacts not ON when HS link executed	After link is enabled with HS link parameters, _HSxRLNK is not ON.
E03-04	_HSxLTBL contact ON when HS link executed	After link enabled with HS link's _HSxRLNK ON, _HSxLTBL is ON due to PLC or communication error.

9. Troubleshooting

9.4. Module check through error codes

Table 36 – Operation error of PADT communication service function

Error code	Error display	Description
E04-01	[No response] message displayed when remote connection requested	RS-232C cable not connected between MasterLogic-200 and PLC, or PLC is powered OFF.
E04-02	[Other error message] displayed when remote connection requested	Service not executed normally due to unsuitable request.

Troubleshooting

1. Error code E00-01: H/W error

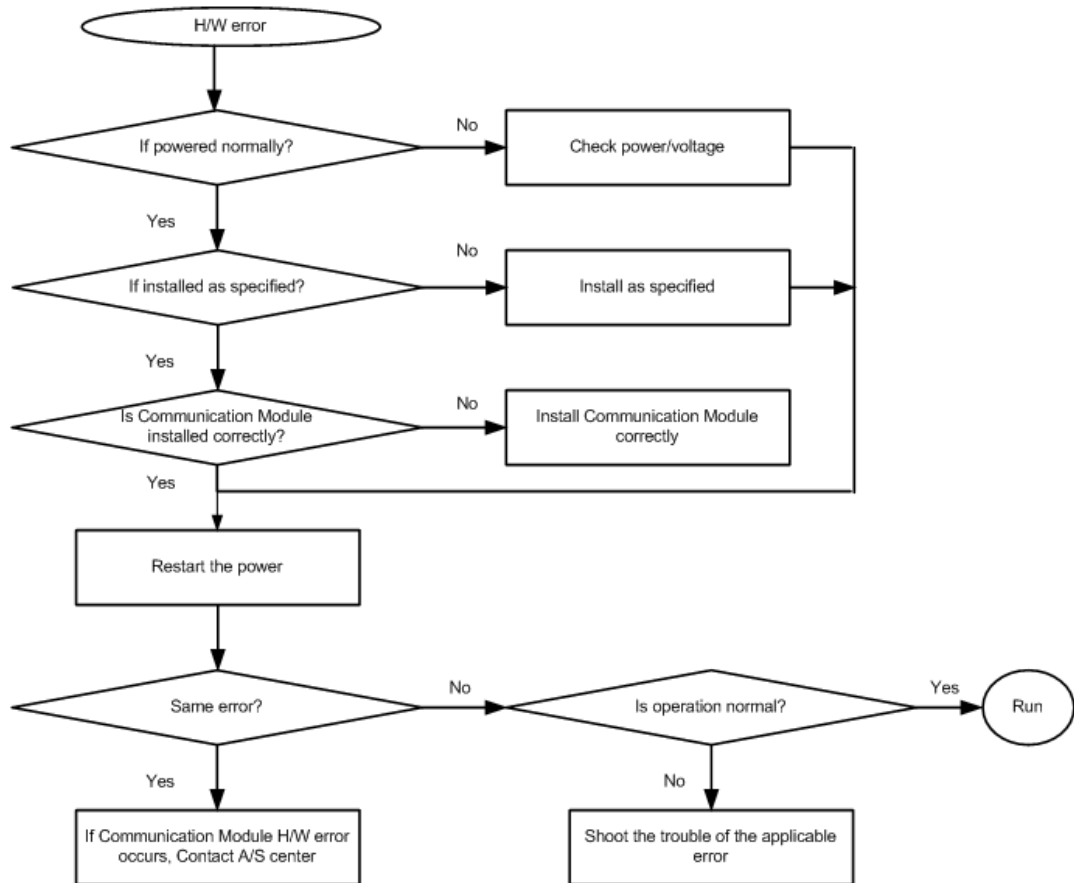


Figure 95 – Hardware error

9. Troubleshooting

9.4. Module check through error codes

2. Error code E00-02: Interface error

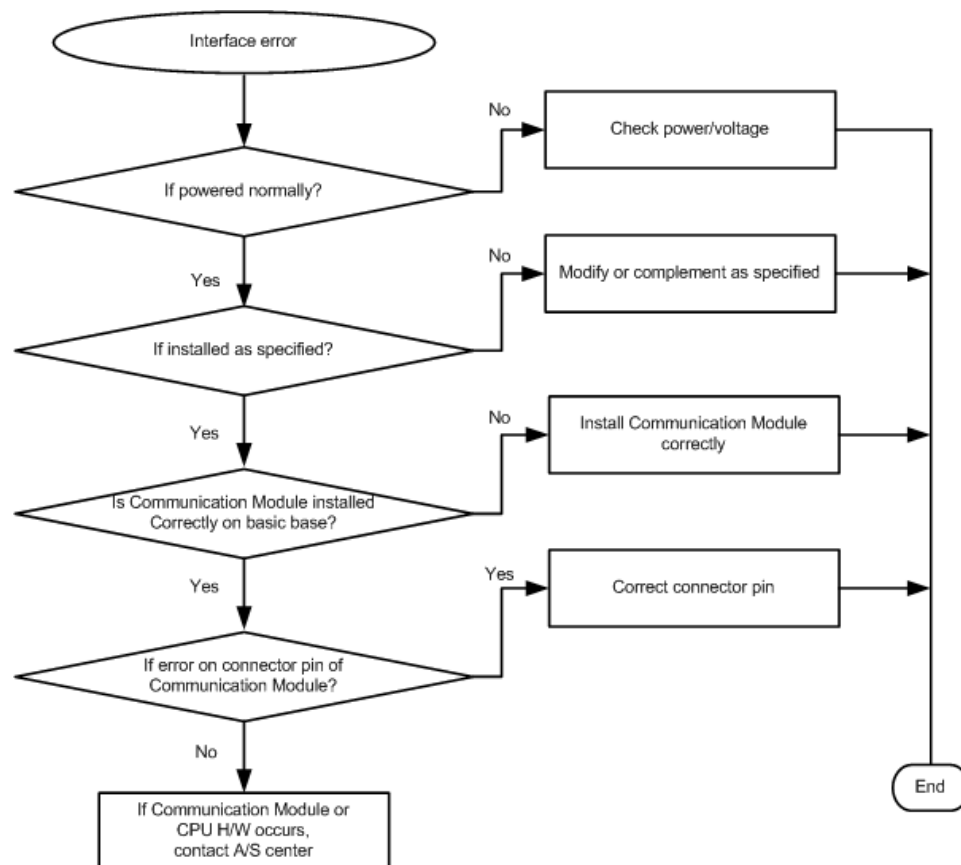


Figure 96 – Interface error

3. Error code E02-01: Interface error with CPU during run

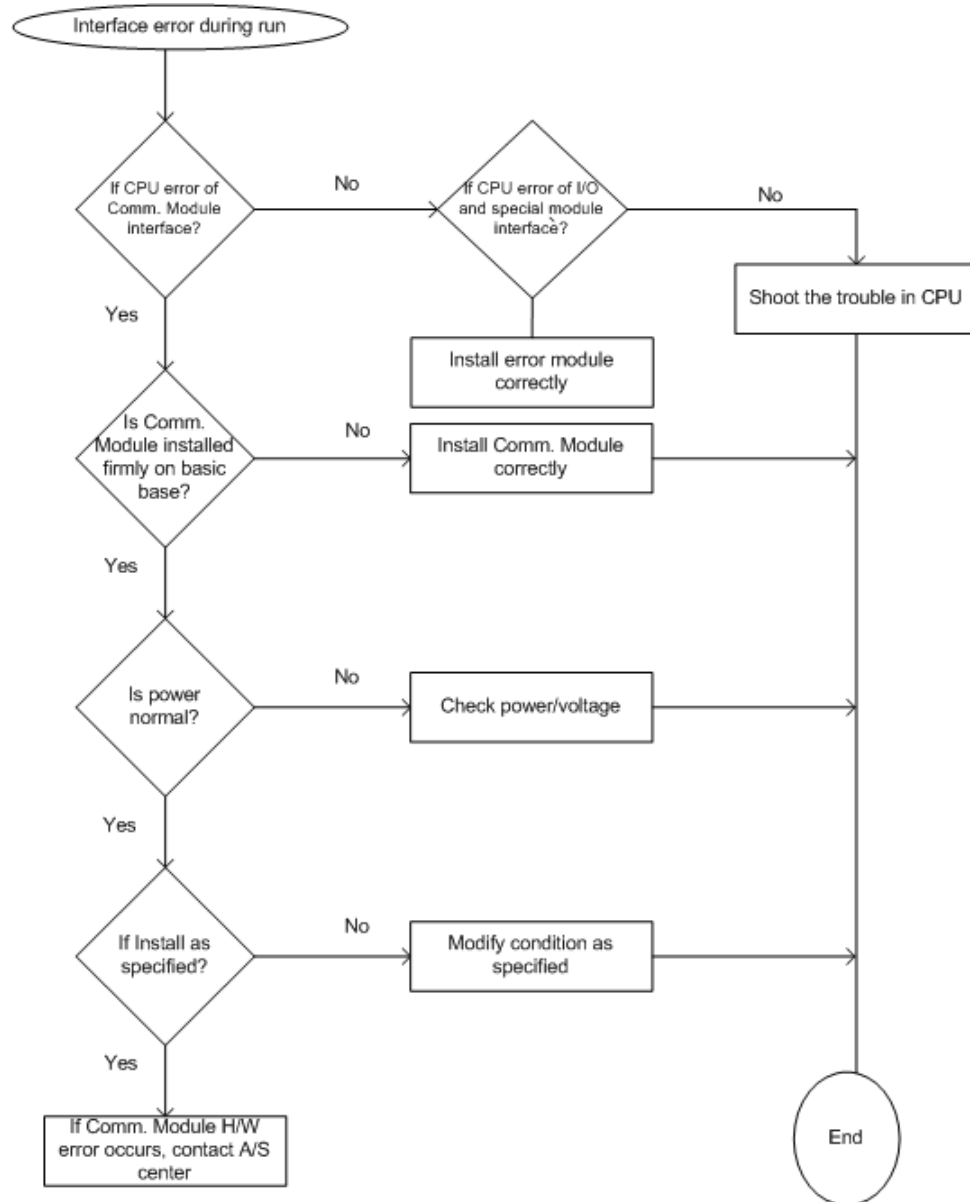


Figure 97 – Interface error

9. Troubleshooting

9.4. Module check through error codes

4. Error code E03-01: HS link parameter error

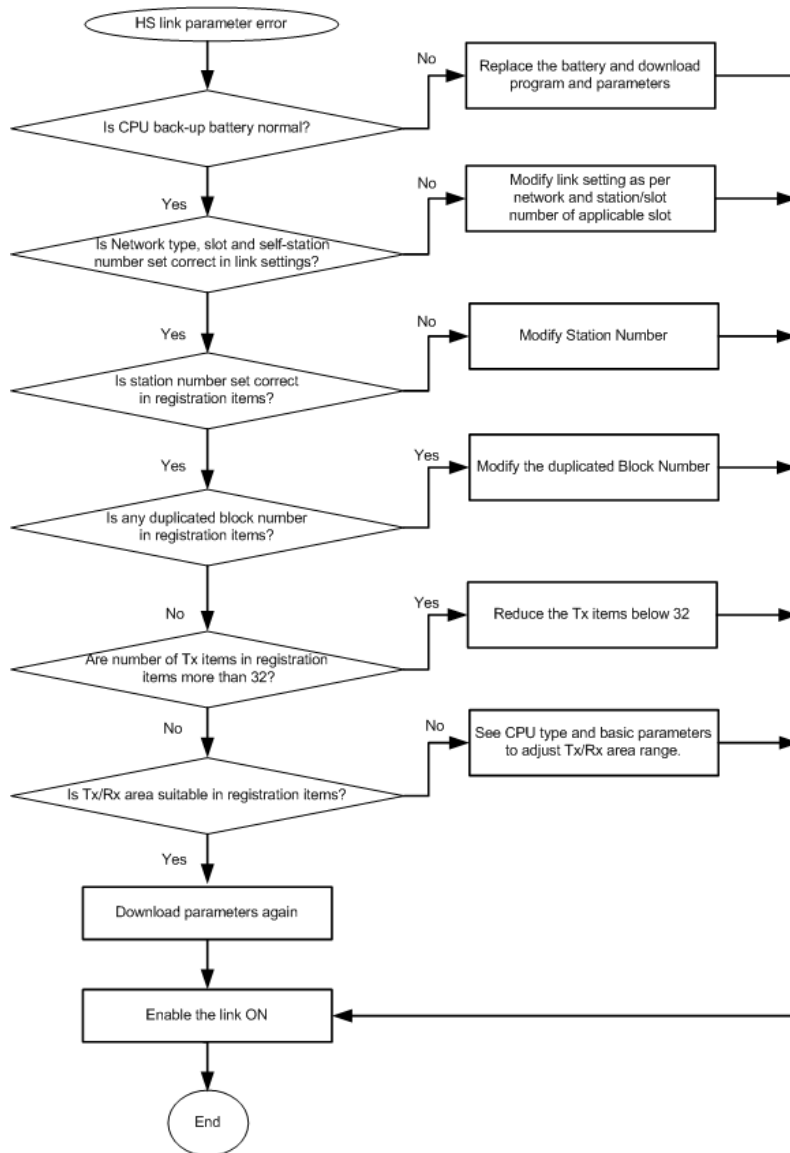


Figure 98 – HS link parameter error

5. Error code E03-02: HS link operation error

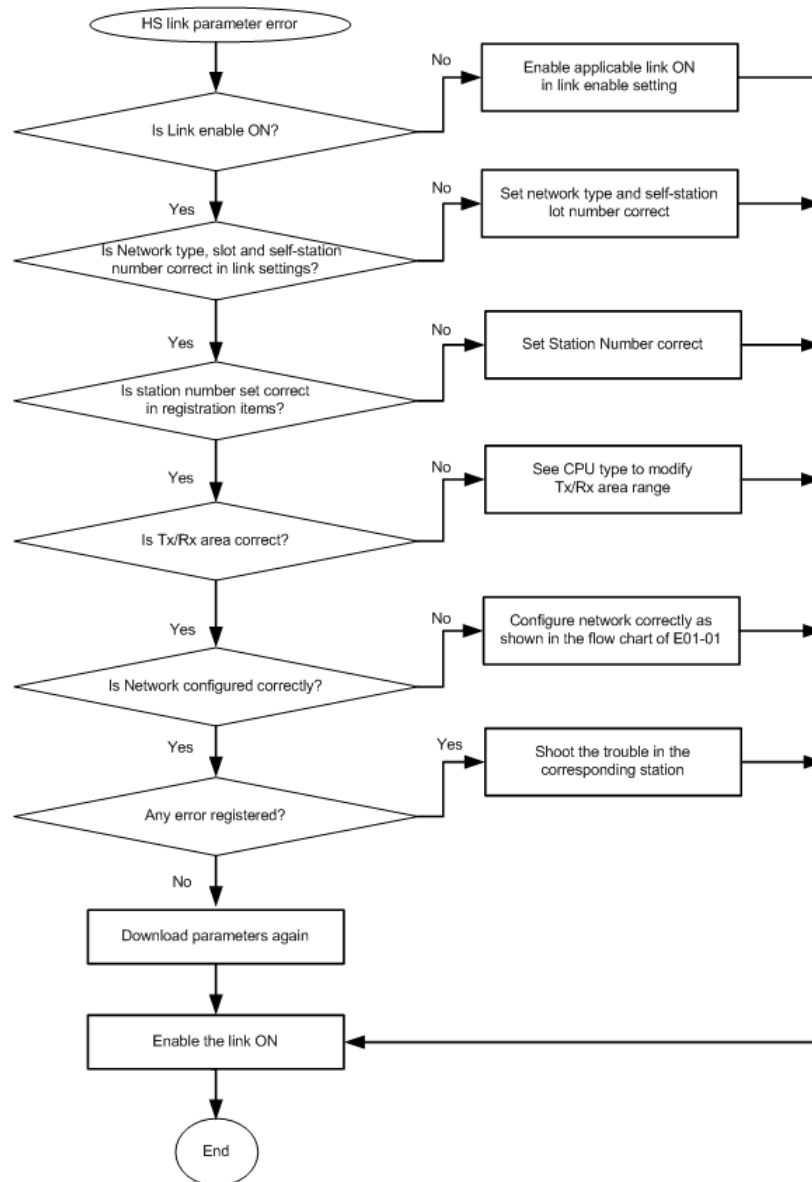


Figure 99 – HS link operation error

9. Troubleshooting

9.4. Module check through error codes

6. Error code E03-03: HS link's Run link contact unavailable

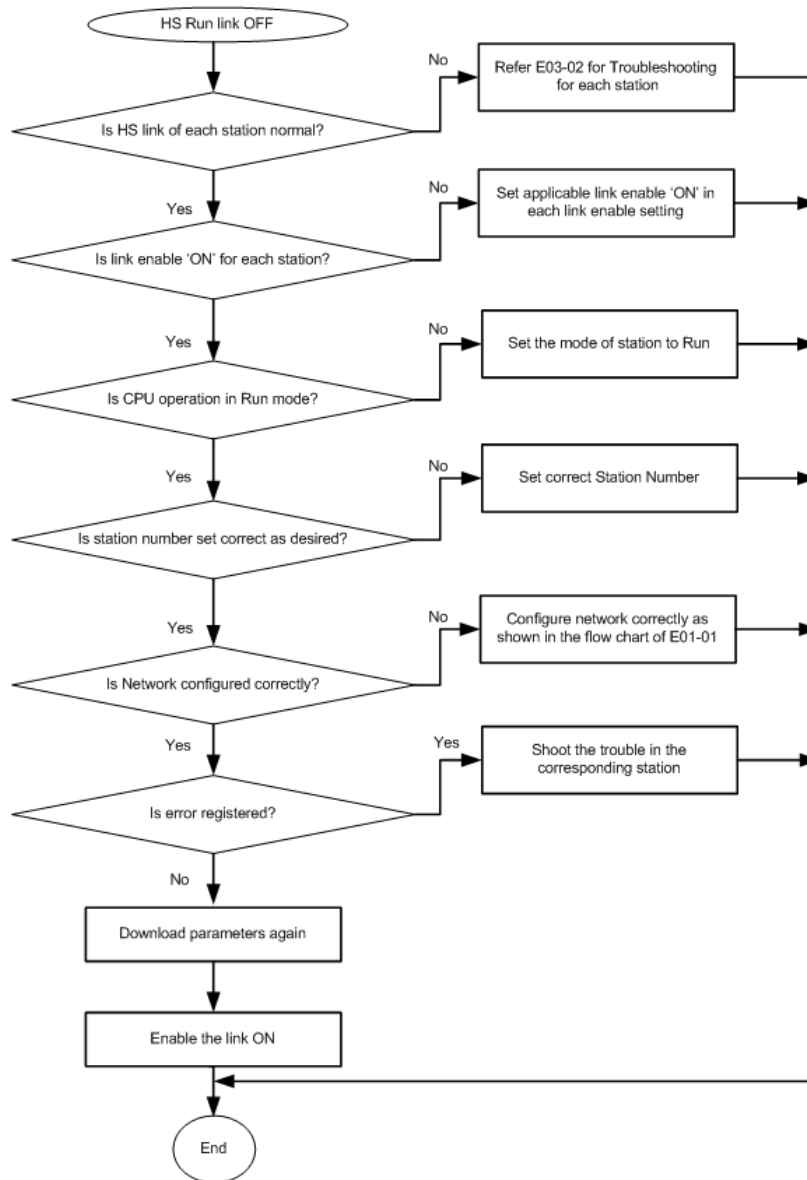


Figure 100 – HS link's Run link unavailable

7. Error code E03-04: HS link trouble contact On

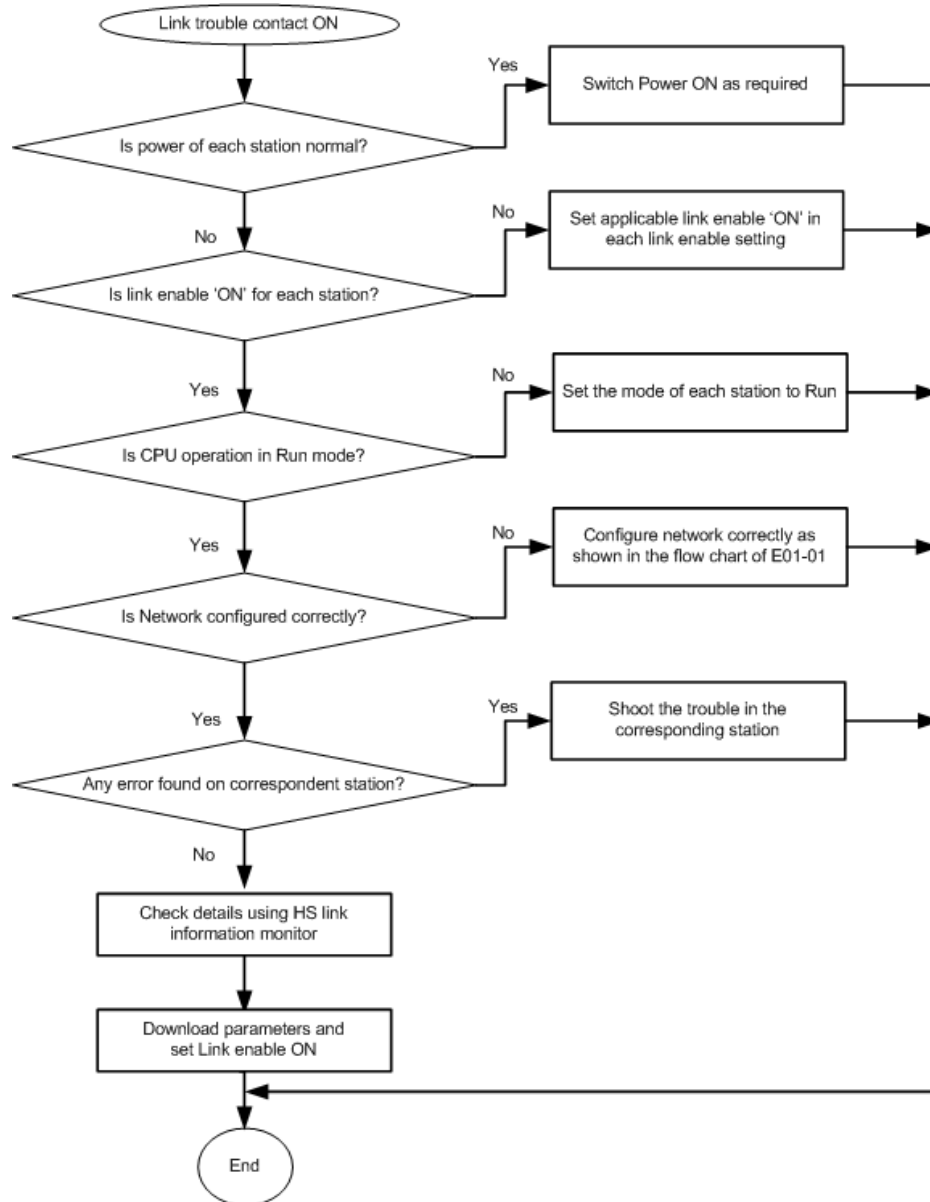


Figure 101 – HS link trouble contact On

9. Troubleshooting

9.4. Module check through error codes

8. Error code E04-01: MasterLogic-200 communication time-out

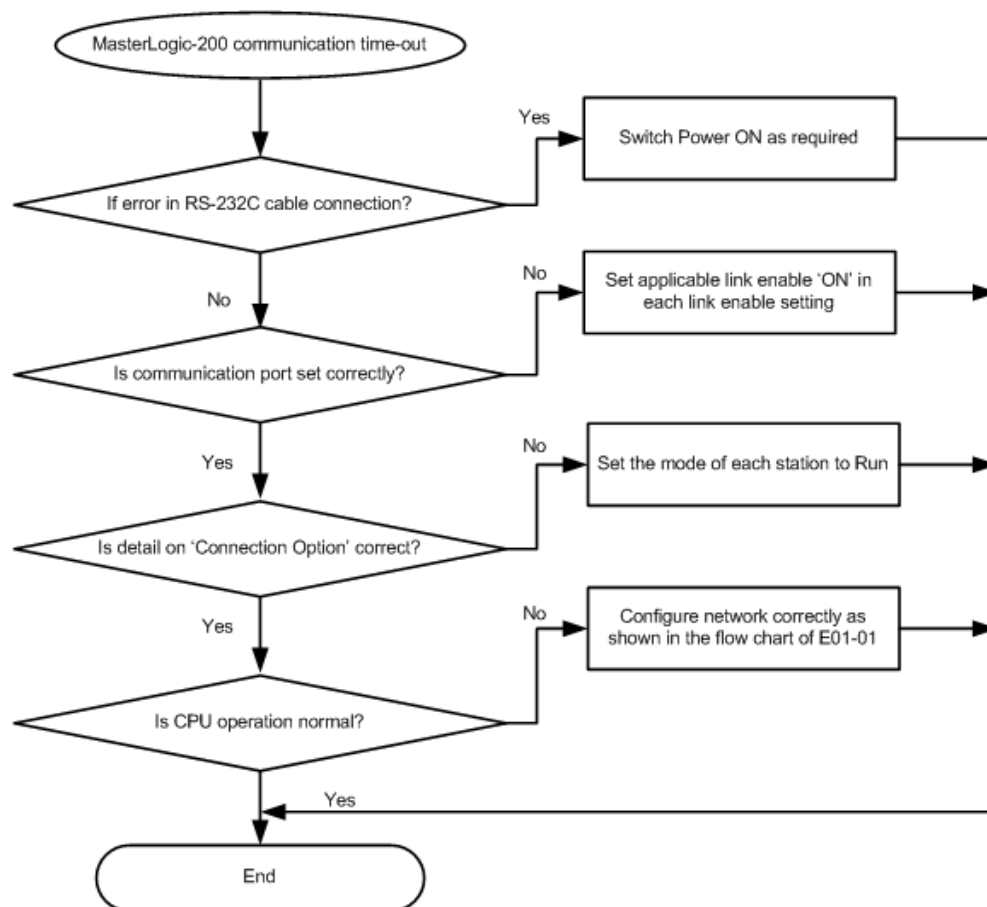


Figure 102 – MasterLogic-200 communication time-out

9. Error code E04-02: MasterLogic-200 internal communication error

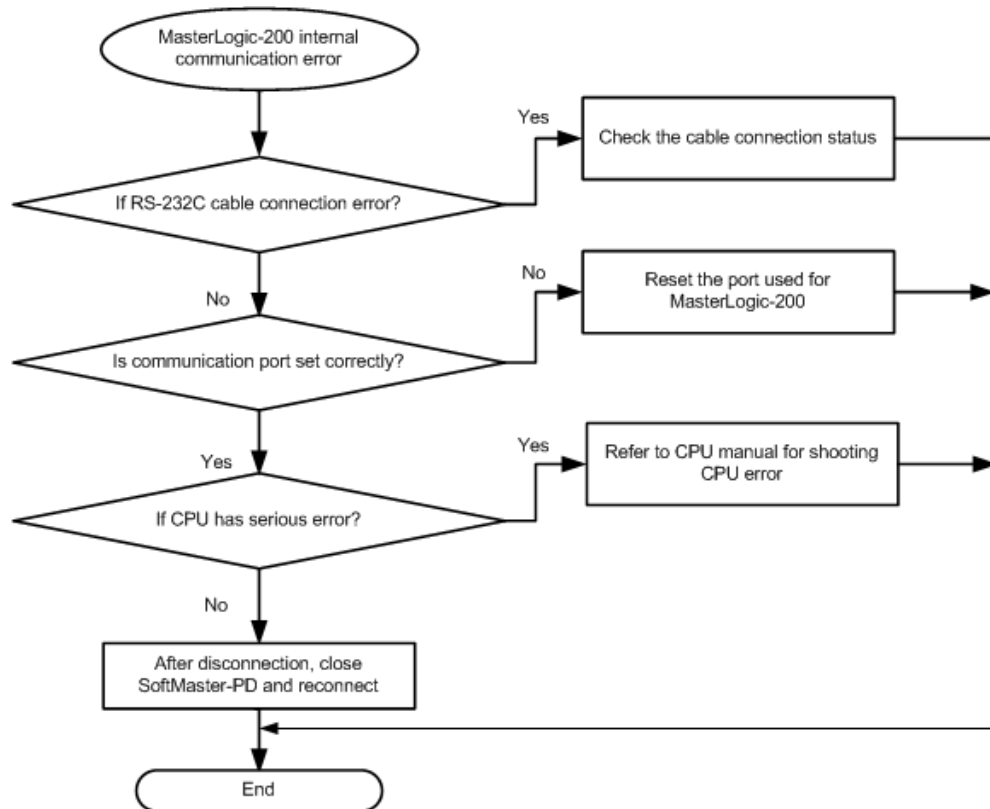


Figure 103 – MasterLogic-200 internal communication error

9. Troubleshooting

9.4. Module check through error codes

10. Appendix

10.1 List of flags

The following table describes the list of special relays (F).

Table 37 – Special relays (F)

Device 1	Device 2	Type	Variable	Function	Description
F0000		DWORD	\overline{E} SYS_STAT	Mode and Status	PLC mode and run status displays.
	F00000	BIT	_RUN	RUN	RUN status.
	F00001	BIT	_STOP	STOP	STOP status.
	F00002	BIT	_ERROR	ERROR	ERROR status.
	F00003	BIT	_DEBUG	DEBUG	DEBUG status.
	F00004	BIT	_LOCAL_CON	Local control	Local control mode.
	F00005	BIT	_MODBUS_CON	Modbus mode	Modbus control mode.
	F00006	BIT	_REMOTE_CON	Remote mode	Remote control mode.
	F00008	BIT	_RUN_EDIT_ST	Modification during run	Program being downloaded during run.
	F00009	BIT	_RUN_EDIT_CHK	Modification during run	Modification in progress during run.
	F0000A	BIT	_RUN_EDIT_DONE	Modification complete during run	Modification complete during run.
	F0000B	BIT	_RUN_EDIT_END	Modification complete during run	Modification complete during run.
	F0000C	BIT	_CMOD_KEY	Run Mode	Run Mode changed by key.
	F0000D	BIT	_CMOD_LPA	Run Mode	Run Mode changed by

10. Appendix
10.1. List of flags

Device 1	Device 2	Type	Variable	Function	Description
			DT		local PADT.
	F0000E	BIT	_CMOD_RPADT	Run Mode	Run Mode changed by remote PADT.
	F0000F	BIT	_CMOD_RLINK	Run Mode	Run Mode changed by remote Communication module.
	F00010	BIT	_FORCE_IN	Compulsory input	Compulsory input status.
	F00011	BIT	_FORCE_OUT	Compulsory output	Compulsory output status.
	F00012	BIT	_SKIP_ON	I/O SKIP	I/O SKIP being executed.
	F00013	BIT	_EMASK_ON	Error mask	Error mask being executed.
	F00014	BIT	_MON_ON	Monitor	Monitor being executed.
	F00015	BIT	_USTOP_ON	STOP	Stopped by STOP function.
	F00016	BIT	_ESTOP_ON	ESTOP	Stopped by ESTOP function.
	F00017	BIT	_CONPILE_MODE	Compiling	Compile being performed.
	F00018	BIT	_INIT_RUN	Initializing	Initialization task being performed.
	F0001C	BIT	_PB1	Program code 1	Program code 1 selected.
	F0001D	BIT	_PB2	Program code 2	Program code 2 selected.

Table 38 – Special relays (2)

Device 1	Device 2	Type	Variable	Function	Description
	F0001E	BIT	_CB1	Compile code 1	Compile code 1 selected.
	F0001F	BIT	_CB2	Compile code 2	Compile code 2 selected.
F0002		DWORD	_CNF_ER	System error	Serious error in system reported.
	F00020	BIT	_CPU_ER	CPU error	CPU configuration error found.
	F00021	BIT	_IO_TYER	Module type error	Module type not identical.
	F00022	BIT	_IO_DEER	Module installation error	Module displaced.
	F00023	BIT	_FUSE_ER	Fuse error	Fuse blown.
	F00024	BIT	_IO_RWER	Module I/O error	Module I/O error found.
	F00025	BIT	_IP_IFER	Module interface error	Error found in Special/communication module interface.
	F00026	BIT	_ANNUM_ER	External equipment Error	Serious error detected in external equipment.
	F00028	BIT	_BPRM_ER	Basic parameter	Basic parameter abnormal.
	F00029	BIT	_IOPRM_ER	IO parameter	IO configuration parameter abnormal.
	F0002A	BIT	_SPPRM_ER	Special module parameter	Special module parameter abnormal.
	F0002B	BIT	_CPPRM_ER	Communication module parameter	Communication module parameter abnormal.
	F0002C	BIT	_PGM_ER	Program error	Program error found.
	F0002D	BIT	_CODE_ER	Code error	Program code error found.
	F0002E	BIT	_SWDT_ER	System watch-dog	System watch-dog active.

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Device 1	Device 2	Type	Variable	Function	Description
	F0002F	BIT	_BASE_POWER_ER	Power error	Base power abnormal.
	F00030	BIT	_WDT_ER	Scan watch-dog	Scan watch-dog active.
F0004		DWORD	_CNF_WAR	System warning	Slight error in system reported.
	F00040	BIT	_RTC_ER	RTC error	RTC data abnormal.
	F00041	BIT	_DBCK_ER	Back-up error	Data back-up error found.
	F00042	BIT	_HBCK_ER	Restart error	Hot restart unavailable.
	F00043	BIT	_ABSD_ER	Run error stop	Stopped due to abnormal run.
	F00044	BIT	_TASK_ER	Task impact	Task being impacted.
	F00045	BIT	_BAT_ER	Battery error	Battery status abnormal.
	F00046	BIT	_ANNUM_WAR	External equipment error	Slight error detected in external equipment.
	F00047	BIT	_LOG_FULL	Memory full	Log memory full
	F00048	BIT	_HS_WAR1	HS link 1	HS link – parameter 1 error
	F00049	BIT	_HS_WAR2	HS link 2	HS link – parameter 2 error
	F0004A	BIT	_HS_WAR3	HS link 3	HS link – parameter 3 error
	F0004B	BIT	_HS_WAR4	HS link 4	HS link – parameter 4 error

Table 39 – Special relays (3)

Device 1	Device 2	Type	Variable	Function	Description
	F0004C	BIT	_HS_WAR5	HS link 5	HS link – parameter 5 error
	F0004D	BIT	_HS_WAR6	HS link 6	HS link – parameter 6 error
	F0004E	BIT	_HS_WAR7	HS link 7	HS link – parameter 7 error
	F0004F	BIT	_HS_WAR8	HS link 8	HS link – parameter 8 error

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10.1. List of flags

Device 1	Device 2	Type	Variable	Function	Description
	F00050	BIT	_HS_WAR9	HS link 9	HS link – parameter 9 error
	F00051	BIT	_HS_WAR10	HS link 10	HS link – parameter 10 error
	F00052	BIT	_HS_WAR11	HS link 11	HS link – parameter 11 error
	F00053	BIT	_HS_WAR12	HS link 12	HS link – parameter 12 error
	F00054	BIT	_P2P_WAR1	P2P parameter 1	P2P – parameter 1 error
	F00055	BIT	_P2P_WAR2	P2P parameter 2	P2P – parameter 2 error
	F00056	BIT	_P2P_WAR3	P2P parameter 3	P2P – parameter 3 error
	F00057	BIT	_P2P_WAR4	P2P parameter 4	P2P – parameter 4 error
	F00058	BIT	_P2P_WAR5	P2P parameter 5	P2P – parameter 5 error
	F00059	BIT	_P2P_WAR6	P2P parameter 6	P2P – parameter 6 error
	F0005A	BIT	_P2P_WAR7	P2P parameter 7	P2P – parameter 7 error
	F0005B	BIT	_P2P_WAR8	P2P parameter 8	P2P – parameter 8 error
	F0005C	BIT	_CONSTANT_ER	Fixed cycle error	Fixed cycle error
F0009		WORD	_USER_F	User contact point	Timer available for user.
	F00090	BIT	_T20MS	20ms	CLOCK of 20ms cycle.
	F00091	BIT	_T100MS	100ms	CLOCK of 100ms cycle.
	F00092	BIT	_T200MS	200ms	CLOCK of 200ms cycle.
	F00093	BIT	_T1S	1s	CLOCK of 1s cycle.
	F00094	BIT	_T2S	2s	CLOCK of 2s cycle.

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Device 1	Device 2	Type	Variable	Function	Description
	F00095	BIT	_T10S	10s	CLOCK of 10s cycle.
	F00096	BIT	_T20S	20s	CLOCK of 20s cycle.
	F00097	BIT	_T60S	60s	CLOCK of 60s cycle.
	F00099	BIT	_ON	Always ON	Bit always ON.
	F0009A	BIT	_OFF	Always OFF	Bit always OFF.
	F0009B	BIT	_1ON	1 scan ON	Bit only ON for the first scan.
	F0009C	BIT	_1OFF	1 scan OFF	Bit only OFF for the first scan.
	F0009D	BIT	_STOG	Reverse	Every scan reversed.
F0010		WORD	_USER_CLK	User CLOCK	CLOCK available to set by user.
	F00100	BIT	_USR_CLK0	Repeat specific scan	ON/OFF CLOCK 0 for specific scan.
	F00101	BIT	_USR_CLK1	Repeat specific scan	ON/OFF CLOCK 1 for specific scan.

Table 40 – Special relays (4)

Device 1	Device 2	Type	Variable	Function	Description
	F00102	BIT	_USR_CLK2	Repeat specific scan	ON/OFF CLOCK 2 for specific scan
	F00103	BIT	_USR_CLK3	Repeat specific scan	ON/OFF CLOCK 3 for specific scan
	F00104	BIT	_USR_CLK4	Repeat specific scan	ON/OFF CLOCK 4 for specific scan
	F00105	BIT	_USR_CLK5	Repeat specific scan	ON/OFF CLOCK 5 for specific scan
	F00106	BIT	_USR_CLK6	Repeat specific scan	ON/OFF CLOCK 6 for specific scan
	F00107	BIT	_USR_CLK7	Repeat specific scan	ON/OFF CLOCK 7 for specific scan

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10.1. List of flags

Device 1	Device 2	Type	Variable	Function	Description
F0011		WORD	_LOGIC_RESULT	Logic result	Logic result displays.
	F00110	BIT	_LER	Calculation error	ON for 1 scan if calculation in error.
	F00111	BIT	_ZERO	Zero flag	ON if calculation result is 0.
	F00112	BIT	_CARRY	Carry flag	ON if Carry found during calculation.
	F00113	BIT	_ALL_OFF	Whole output OFF	ON if all output OFF
	F00115	BIT	_LER_LATC H	Calculation error latch	ON kept if calculation in error.
F0012		WORD	_CMP_RESULT	Compared result	Compared result displays.
	F00120	BIT	_LT	LT flag	ON if 'less than'
	F00121	BIT	_LTE	LTE flag	ON if 'less than or equal'
	F00122	BIT	_EQU	EQU flag	ON if 'equal'
	F00123	BIT	_GT	GT flag	ON if 'greater than'
	F00124	BIT	_GTE	GTE flag	ON if 'greater than or equal'
	F00125	BIT	_NEQ	NEQ flag	ON if 'not equal'
F0013		WORD	_AC_F_CNT	Inspected power cut	Number of inspected power-cuts displays.
F0014		WORD	_FALS_NUM	FALS number	FALS number displays.
F0015		WORD	_PUTGET_ERR0	PUT/GET error 0	Main base PUT / GET error
F0016		WORD	_PUTGET_ERR1	PUT/GET error 1	Added base step 1 PUT / GET error
F0017		WORD	_PUTGET_ERR2	PUT/GET error 2	Added base step 2 PUT / GET error
F0018		WORD	_PUTGET_ERR3	PUT/GET error 3	Added base step 3 PUT / GET error

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Device 1	Device 2	Type	Variable	Function	Description
F0019		WORD	_PUTGET_ERR4	PUT/GET error 4	Added base step 4 PUT / GET error
F0020		WORD	_PUTGET_ERR5	PUT/GET error 5	Added base step 5 PUT / GET error
F0021		WORD	_PUTGET_ERR6	PUT/GET error 6	Added base step 6 PUT / GET error
F0022		WORD	_PUTGET_ERR7	PUT/GET error 7	Added base step 7 PUT / GET error
F0023		WORD	_PUTGET_NDR0	PUT/GET complete 0	Main base PUT / GET complete
F0024		WORD	_PUTGET_NDR1	PUT/GET complete 1	Added base step 1 PUT / GET complete
F0025		WORD	_PUTGET_NDR2	PUT/GET complete 2	Added base step 2 PUT / GET complete
F0026		WORD	_PUTGET_NDR3	PUT/GET complete 3	Added base step 3 PUT / GET complete
F0027		WORD	_PUTGET_NDR4	PUT/GET complete 4	Added base step 4 PUT / GET complete
F0028		WORD	_PUTGET_NDR5	PUT/GET complete 5	Added base step 5 PUT / GET complete

Table 41 – Special relays (5)

Device 1	Device 2	Type	Variable	Function	Description
F0029		WORD	_PUTGET_NDR6	PUT/GET complete 6	Added base step 6 PUT / GET complete
F0030		WORD	_PUTGET_NDR7	PUT/GET complete 7	Added base step 7 PUT / GET complete
F0044		WORD	_CPU_TYPE	CPU type	Information on CPU type displays.
F0045		WORD	_CPU_VER	CPU version	CPU version displays.
F0046		DWORD	_OS_VER	OS version	OS version displays.

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Device 1	Device 2	Type	Variable	Function	Description
F0048		DWORD	_OS_DATE	OS date	OS released date displays.
F0050		WORD	_SCAN_MAX	Max. scan time	Max. scan time displays.
F0051		WORD	_SCAN_MIN	Min. scan time	Min. scan time displays.
F0052		WORD	_SCAN_CUR	Present scan time	Current scan time displays.
F0053		WORD	_MON_YEAR	Month / Year	PLC's time information (Month/Year)
F0054		WORD	_TIME_DAY	Hour / Date	PLC's time information (Hour/Date)
F0055		WORD	_SEC_MIN	Second / Minute	PLC's time information (Second/Minute)
F0056		WORD	_HUND_WK	100 years / Day	PLC's time information (100 years/Day)
F0057		WORD	_FPU_INFO	FPU calculation result	Floating decimal calculation result displays.
	F00570	BIT	_FPU_LFLAG_I	Incorrect error latch	Latched if incorrect error.
	F00571	BIT	_FPU_LFLAG_U	Underflow latch	Latched if underflow found.
	F00572	BIT	_FPU_LFLAG_O	Overflow latch	Latched if overflow found.
	F00573	BIT	_FPU_LFLAG_Z	Latch divided by 0	Latched if divided by 0.
	F00574	BIT	_FPU_LFLAG_V	Invalid calculation latch	Latched if invalid calculation.
	F0057A	BIT	_FPU_FLAG_I	Incorrect error	Reported if incorrect error found.
	F0057B	BIT	_FPU_FLAG_U	Underflow	Reported if underflow found.
	F0057C	BIT	_FPU_FLAG_O	Overflow	Reported if overflow found.

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Device 1	Device 2	Type	Variable	Function	Description
	F0057D	BIT	$\overline{\text{FPU_FLAG_Z}}$	Division by 0	Reported if divided by 0.
	F0057E	BIT	$\overline{\text{FPU_FLAG_V}}$	Invalid calculation	Reported if calculation invalid.
	F0057F	BIT	$\overline{\text{FPU_FLAG_E}}$	Irregular value input	Reported if irregular value input.
F0058		DWORD	_ERR_STEP	Error step	Error step saved.
F0060		DWORD	_REF_COUN_T	Refresh	Increased when module refresh executed.
F0062		DWORD	_REF_OK_CNT	Refresh OK	Increased if module refresh normal.
F0064		DWORD	_REF_NG_CNT	Refresh NG	Increased if module refresh abnormal.
F0066		DWORD	_REF_LIM_CNT	Refresh LIMIT	Increased if modules refresh abnormal (TIME OUT).
F0068		DWORD	_REF_ERR_CNT	Refresh ERROR	Increased if module refresh abnormal.
F0070		DWORD	_MOD_RD_ERR_CNT	Module READ ERROR	Increased if module reads 1 word abnormally.
F0072		DWORD	_MOD_WR_ERR_CNT	Module WRITE ERROR	Increased if module writes 1 word abnormally.

Table 42 – Special relays (6)

Device 1	Device 2	Type	Variable	Function	Description
F0074		DWORD	_CA_CNT	Block service	Increased if module's block data serviced.
F0076		DWORD	_CA_LIM_CNT	Block service LIMIT	Increased if module's block data service abnormal.
F0078		DWORD	_CA_ERR_CNT	Block service ERROR	Increased if module's block data service abnormal.

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Device 1	Device 2	Type	Variable	Function	Description
F0080		DWORD	_BUF_FULL_CNT	Buffer FULL	Increased if CPU's internal buffer is FULL.
F0082		DWORD	_PUT_CNT	PUT count	Increased if PUT executed.
F0084		DWORD	_GET_CNT	GET count	Increased if GET executed.
F0086		DWORD	_KEY	Present key	Local key's current status displays.
F0088		DWORD	_KEY_PREV	Previous key	Local key's previous status displays.
F0090		WORD	_IO_TYER_N	Discordant slot	Slot number with discordant module type displays.
F0091		WORD	_IO_DEER_N	Displaced slot	Slot number with displaced module displays.
F0092		WORD	_FUSE_ER_N	Fuse blown slot	Slot number with fuse blown displays.
F0093		WORD	_IO_RWER_N	RW error slot	Slot number with module Read/Write error displays.
F0094		WORD	_IP_IFER_N	IF error slot	Slot number with module interface error displays.
F0096		WORD	_IO_TYER0	Module type 0 error	Main base module type error.
F0097		WORD	_IO_TYER1	Module type 1 error	Added base step 1 module type error.
F0098		WORD	_IO_TYER2	Module type 2 error	Added base step 2 module type error.
F0099		WORD	_IO_TYER3	Module type 3 error	Added base step 3 module type error.
F0100		WORD	_IO_TYER4	Module type 4 error	Added base step 4 module type error.
F0101		WORD	_IO_TYER5	Module type 5 error	Added base step 5 module type error
F0102		WORD	_IO_TYER6	Module type 6	Added base step 6 module

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Device 1	Device 2	Type	Variable	Function	Description
				error	type error.
F0103		WORD	_IO_TYER7	Module type 7 error	Added base step 7 module type error.
F0104		WORD	_IO_DEER 0	Module installation 0 error	Main base module installation error.
F0105		WORD	_IO_DEER 1	Module installation 1 error	Added base step 1 module installation error.
F0106		WORD	_IO_DEER 2	Module installation 2 error	Added base step 2 module installation error.
F0107		WORD	_IO_DEER 3	Module installation 3 error	Added base step 3 module installation error.
F0108		WORD	_IO_DEER 4	Module installation 4 error	Added base step 4 module installation error.
F0109		WORD	_IO_DEER 5	Module installation 5 error	Added base step 5 module installation error.
F0110		WORD	_IO_DEER 6	Module installation 6 error	Added base step 6 module installation error.
F0111		WORD	_IO_DEER 7	Module installation 7 error	Added base step 7 module installation error.
F0112		WORD	_FUSE_ER 0	Fuse blown 0 error	Main base Fuse blown error.
F0113		WORD	_FUSE_ER 1	Fuse blown 1 error	Added base step 1 Fuse blown error.

Device 1	Device 2	Type	Variable	Function	Description
F0114		WORD	$_FUSE_ER$ 2	Fuse blown 2 error	Added base step 2 Fuse blown error.
F0115		WORD	$_FUSE_ER$ 3	Fuse blown 3 error	Added base step 3 Fuse blown error.

Table 43 – Special relays (7)

Device 1	Device 2	Type	Variable	Function	Description
F0116		WORD	$_FUSE_ER$ 4	Fuse blown 4 error	Added base step 4 Fuse blown error.
F0117		WORD	$_FUSE_ER$ 5	Fuse blown 5 error	Added base step 5 Fuse blown error.
F0118		WORD	$_FUSE_ER$ 6	Fuse blown 6 error	Added base step 6 Fuse blown error.
F0119		WORD	$_FUSE_ER$ 7	Fuse blown 7 error	Added base step 7 Fuse blown error.
F0120		WORD	$_IO_RWER$ 0	Module RW 0 error	Main base module Read/Write error.
F0121		WORD	$_IO_RWER$ 1	Module RW 1 error	Added base step 1 module Read/Write error.
F0122		WORD	$_IO_RWER$ 2	Module RW 2 error	Added base step 2 module Read/Write error.
F0123		WORD	$_IO_RWER$ 3	Module RW 3 error	Added base step 3 module Read/Write error.
F0124		WORD	$_IO_RWER$ 4	Module RW 4 error	Added base step 4 module Read/Write error.
F0125		WORD	$_IO_RWER$ 5	Module RW 5 error	Added base step 5 module Read/Write error.
F0126		WORD	$_IO_RWER$ 6	Module RW 6 error	Added base step 6 module Read/Write error.
F0127		WORD	$_IO_RWER$ 7	Module RW 7 error	Added base step 7 module Read/Write error.

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Device 1	Device 2	Type	Variable	Function	Description
F0128		WORD	_IO_IFER_ 0	Module IF 0 error	Main base module interface error.
F0129		WORD	_IO_IFER_ 1	Module IF 1 error	Added base step 1 module interface error.
F0130		WORD	_IO_IFER_ 2	Module IF 2 error	Added base step 2 module interface error.
F0131		WORD	_IO_IFER_ 3	Module IF 3 error	Added base step 3 module interface error.
F0132		WORD	_IO_IFER_ 4	Module IF 4 error	Added base step 4 module interface error.
F0133		WORD	_IO_IFER_ 5	Module IF 5 error	Added base step 5 module interface error.
F0134		WORD	_IO_IFER_ 6	Module IF 6 error	Added base step 6 module interface error.
F0135		WORD	_IO_IFER_ 7	Module IF 7 error	Added base step 7 module interface error.
F0136		WORD	_RTC_DAT E	RTC date	RTC's current date.
F0137		WORD	_RTC_WEE K	RTC day	RTC's current day of the week.
F0138		DWORD	_RTC_TOD	RTC time	RTC's current time (ms unit).
F0140		DWORD	_AC_FAIL_ CNT	Power-cut times	Power-cut times saved.
F0142		DWORD	_ERR_HIS_ CNT	Errors found	Number of found errors saved.
F0144		DWORD	_MOD_HIS_ CNT	Mode conversion times	Mode conversion times saved.
F0146		DWORD	_SYS_HIS_ CNT	History updated times	System's history updated times saved.

Table 44 – Special Relays (8)

Device 1	Device 2	Type	Variable	Function	Description
F0148		DWORD	_LOG_ROTATE	Log rotate	Log rotate information saved.
F0150		WORD	_BASE_INF00	Slot information 0	Main base slot information.
F0151		WORD	_BASE_INF01	Slot information 1	Added base step 1 slot information.
F0152		WORD	_BASE_INF02	Slot information 2	Added base step 2 slot information.
F0153		WORD	_BASE_INF03	Slot information 3	Added base step 3 slot information.
F0154		WORD	_BASE_INF04	Slot information 4	Added base step 4 slot information.
F0155		WORD	_BASE_INF05	Slot information 5	Added base step 5 slot information.
F0156		WORD	_BASE_INF06	Slot information 6	Added base step 6 slot information.
F0157		WORD	_BASE_INF07	Slot information 7	Added base step 7 slot information.
F0158		WORD	_RBANK_NUM	Used block number	Currently used block number.
F0159		WORD	_RBLOCK_STATE	Flash status	Flash block status.
F0160		DWORD	_RBLOCK_RD_FLAG	Flash Read	ON when reading Flash N block data.
F0162		DWORD	_RBLOCK_WR_FLAG	Flash Write	ON when writing Flash N block data.
F0164		DWORD	_RBLOCK_ER_FLAG	Flash error	Error found during Flash N block service.
F1024		WORD	_USER_WRITE_F	Available contact	Contact point available in program.

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10.1. List of flags

Device 1	Device 2	Type	Variable	Function	Description
	F10240	BIT	_RTC_WR	RTC RW	Data Write and Read in RTC.
	F10241	BIT	_SCAN_W R	Scan WR	Scan value initialization.
	F10242	BIT	_CHK_ANC _ERR	Detect external serious error	Detection of serious error in external equipment requested.
	F10243	BIT	_CHK_ANC _WAR	Detect external slight error	Detection of slight error in external equipment requested.
F1025		WORD	_USER_ST AUS_F	User contact point	User contact point.
	F10250	BIT	_INIT_DON E	Initialization complete	Initialization complete displays.
F1026		WORD	_ANC_ERR	External serious error information	Serious error information in external equipment displays.
F1027		WORD	_ANC_WA R	External slight error information	Slight error information in external equipment displays.
F1034		WORD	_MON_YEA R_DT	Month / Year	Time information data (Month/Year)
F1035		WORD	_TIME_DA Y_DT	Hour / Date	Time information data (Hour/Date).
F1036		WORD	_SEC_MIN _DT	Second / Minute	Time information data (Second/Minute).
F1037		WORD	_HUND_W K_DT	100 years / Day	Time information data (100 years/Day).

10.2 List of communication relays (L)

1. Special register for data link

HS link Number 1 – 12

Table 45 – List of communication flags based on HS link number

Number	Keyword	Type	Detail	Description
L000000	<u>HS1_RLI</u> NK	Bit	HS link parameter number 1's, all stations normally operate	<p>Displays all stations normally operated as specified in HS link parameter, which will be ON if</p> <ul style="list-style-type: none"> a) There is no error with all stations specified in parameter in RUN mode. b) All data block is in normal communication as specified in parameter. c) The parameter specified in each station itself is in normal communication. Once the RUN_link is switched ON it keeps functioning till it is switched OFF by disabling the link.
L000001	<u>HS1_LTR</u> BL	Bit	After _HS1RLINK is ON, abnormal status displays	<p>This flag is ON if the station specified in parameter and the data block's communication status are as described below with _HSmRLINK flag ON.</p> <ul style="list-style-type: none"> a) When the station specified in parameter is not in RUN mode. b) When the station specified in parameter is in error. c) When data block's communication status specified in parameter is unstable. <p>The link trouble will be ON if one of those conditions a, b, or c occurs. And if such a condition is</p>

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10.2. List of communication relays (L)

Number	Keyword	Type	Detail	Description
				back to normal, it will be OFF.
L000020 – L00009F	_HS1_STA TE[k](k=00 0–127)	Bit Array	HS link parameter Number 1, Block Number k's general status displays	Displays the general status of the communication information for the specified parameter's respective data blocks. HS1STATE[k]=HS1MOD[k]&_HS1TR X[k]&(_HSmERR[k])
L000100 – L00017F	_HS1_MO D[k] (k=000– 127)	Bit Array	HS link parameter Number 1, Block Number k station's Run operation mode	Displays the operation mode of the station specified in parameter's data block k.
L000180 – L00025F	_HS1_TRX [k] (k=000– 127)	Bit Array	Normal communicatio n displays with HS link parameter Number 1, Block Number k station	Displays the communication status of parameter's data block k to check if normal as specified.
L000260 – L00033F	_HS1_ER R[k] (k=000– 127)	Bit Array	HS link parameter Number 1, Block Number k station's Run error mode	Displays the communication status of parameter's data block k to check for any error.
L000340 – L00041F	_HS1_SET BLOCK [k=000– 127]	Bit Array	HS link parameter Number 1, Block Number k setting displays	Displays the setting status of parameter's data block k.

Table 46 – HS link numbers and addresses

HS link Number	L area address	Remarks
2	L000500–L00099F	<p>Compared with HS link of 1 in [Table 1], other HS link station number's flag address will be simply calculated as follows;</p> <p>Calculation formula:</p> <p>L area address = L000000 + 500 x (HS link Number – 1)</p> <p>In order to use HS link flag for program and monitoring, use the flag map registered in SoftMaster for convenient application.</p>
3	L001000–L00149F	
4	L001500–L00199F	
5	L002000–L00249F	
6	L002500–L00299F	
7	L003000–L00349F	
8	L003500–L00399F	
9	L004000–L00449F	
10	L004500–L00499F	
11	L005000–L00549F	

K as a block number displays through 8 words by 16 for 1 word for the information of 128 blocks from 000 to 127.

For example, block information of 16–31, 32–47, 48–63, 64–79, 80–95, 96–111, 112–127 will display in L00011, L00012, L00013, L00014, L00015, L00016, and L00017 from block 0 to block 15 for mode information (_HS1MOD).

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10.2. List of communication relays (L)

P2P parameters: 1–8, P2P block: 0–63

Table 47 – List of communication flags based on P2P service setting (1)

Number	Keyword	Type	Detail	Description
L006250	_P2P1_NDR 00	Bit	P2P parameter Number 1, block Number 00, service to complete normally	P2P parameter Number 1, block Number 0, service to complete normally
L006251	_P2P1_ERR 00	Bit	P2P parameter Number 1, block Number 00, service to complete abnormally	P2P parameter Number 1, block Number 0, service to complete abnormally
L00626	_P2P1_STA TUS00	Word	Error code if P2P parameter Number 1, block Number 00, service to complete abnormally	Error code displays if P2P parameter Number 1, block Number 0, service to complete abnormally
L00627	_P2P1_SVC CNT00	DWord	P2P parameter Number 1, block Number 00, service normal execution times	P2P parameter Number 1, block Number 0, service normal execution times displays
L00629	_P2P1_ERR CNT00	DWord	P2P parameter Number 1, block Number 00, service abnormal execution times	P2P parameter Number 1, block Number 0, service abnormal execution times displays
L006310	_P2P1_NDR 01	Bit	P2P parameter Number 1, block Number 01, service to complete normally	P2P parameter Number 1, block Number 1, service to complete normally
L006311	_P2P1_ERR 01	Bit	P2P parameter Number 1, block Number 01, service to complete abnormally	P2P parameter Number 1, block Number 1, service to complete abnormally

Number	Keyword	Type	Detail	Description
L00632	<u>P2P1</u> _STA TUS01	Word	Error code if P2P parameter Number 1, block Number 01, service to complete abnormally	Error code displays if P2P parameter Number 1, block Number 1, service to complete abnormally
L00633	<u>P2P1</u> _SVC CNT01	DWord	P2P parameter Number 1, block Number 01 service, normal execution times	P2P parameter Number 1, block Number 1 service, normal execution times displays
L00635	<u>P2P1</u> _ERR CNT01	DWord	P2P parameter Number 1, block Number 01 service, abnormal execution times	P2P parameter Number 1, block Number 1 service, abnormal execution times displays

2. List of link devices (N)

P2P Number: 1 – 8, P2P block: 0 – 63

Table 48 – List of communication flags based on P2P service setting (2)

Number	Keyword	Type	Detail	Description
N00000	<u>P1B00S</u> N	Word	P2P parameter Number 1, block Number 00's, corresponding station number	P2P parameter Number 1, block Number 00's, corresponding station number saved. Use P2PSN instruction to modify during Run if corresponding station number is used in SoftMaster-NM.
N00001 – N00004	<u>P1B00R</u> D1	Device structure	P2P parameter Number 1, block Number 00, area device 1 to read	P2P parameter Number 1, block Number 00, area device 1 to read saved.
N00005	<u>P1B00R</u>	Word	P2P parameter	P2P parameter Number 1,

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10.2. List of communication relays (L)

Number	Keyword	Type	Detail	Description
	S1		Number 1, block Number 00, area size 1 to read	block Number 00, area size 1 to read saved.
N00006 – N00009	_P1B00R D2	Device structure	P2P parameter Number 1, block Number 00, area device 2 to read	P2P parameter Number 1, block Number 00, area device 2 to read saved.
N00010	_P1B00R S2	Word	P2P parameter Number 1, block Number 00, area size 2 to read	P2P parameter Number 1, block Number 00, area size 2 to read saved.
N00011 – N00014	_P1B00R D3	Device structure	P2P parameter Number 1, block Number 00, area device 3 to read	P2P parameter Number 1, block Number 00, area device 3 to read saved.
N00015	_P1B00R S3	Word	P2P parameter Number 1, block Number 00, area size 3 to read	P2P parameter Number 1, block Number 00, area size 3 to read saved.
N00016 – N00019	_P1B00R D4	Device structure	P2P parameter Number 1, block Number 00, area device 4 to read	P2P parameter Number 1, block Number 00, area device 4 to read saved.
N00020	_P1B00R S4	Word	P2P parameter Number 1, block Number 00, area size 4 to read	P2P parameter Number 1, block Number 00, area size 4 to read saved.
N00021 – N00024	_P1B00 WD1	Device structure	P2P parameter Number 1, block Number 00 saved, area device 1	P2P parameter Number 1, block Number 00 saved, area device 1 saved.
N00025	_P1B00 WS1	Word	P2P parameter Number 1, block Number 00 saved, area size 1	P2P parameter Number 1, block Number 00 saved, area size 1 saved.
N00026 – N00029	_P1B00 WD2	Device structure	P2P parameter Number 1, block Number 00 saved,	P2P parameter Number 1, block Number 00 saved, area device 2 saved.

Number	Keyword	Type	Detail	Description
			area device 2	
N00030	_P1B00 WS2	Word	P2P parameter Number 1, block Number 00 saved, area size 2	P2P parameter Number 1, block Number 00 saved, area size 2 saved.
N00031 N00034	_P1B00 WD3	Device structure	P2P parameter Number 1, block Number 00 saved, area device 3	P2P parameter Number 1, block Number 00 saved, area device 3 saved.
N00035	_P1B00 WS3	Word	P2P parameter Number 1, block Number 00 saved, area size 3	P2P parameter Number 1, block Number 00 saved, area size 3 saved.

Table 49 – List of communication flags based on P2P service setting (3)

Number	Keyword	Type	Detail	Description
N00036 – N00039	_P1B00 WD4	Device structure	P2P parameter Number 1, block Number 00, saved area device 4	P2P parameter Number 1, block Number 00, saved area device 4 saved.
N00040	_P1B00 WS4	Word	P2P parameter Number 1, block Number 00 saved, area size 4	P2P parameter Number 1, block Number 00 saved, area size 4 saved.
N00041	_P1B01S N	Word	P2P parameter Number 1, block Number 01, corresponding station number	P2P parameter Number 1, block Number 01's corresponding station Number saved. Use P2PSN instruction to modify during Run if corresponding station number is used in SoftMaster-NM.

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10.2. List of communication relays (L)

Number	Keyword	Type	Detail	Description
N00042 – N00045	_P1B01R D1	Device structure	P2P parameter Number 1, block Number 01, area device 1 to read	P2P parameter Number 1, block Number 01, device area 1 to read saved.
N00046	_P1B01R S1	Word	P2P parameter Number 1, block Number 01, area size 1 to read	P2P parameter Number 1, block Number 01, area size 1 to read saved.
N00047 – N00050	_P1B01R D2	Device structure	P2P parameter Number 1, block Number 01, area device 2 to read	P2P parameter Number 1, block Number 01, area device 1 to read saved.
N00051	_P1B01R S2	Word	P2P parameter Number 1, block Number 01, area size 2 to read	P2P parameter Number 1, block Number 01, area size 2 to read saved.
N00052 – N00055	_P1B01R D3	Device structure	P2P parameter Number 1, block Number 01, area device 3 to read	P2P parameter Number 1, block Number 01, area device 3 to read saved.
N00056	_P1B01R S3	Word	P2P parameter Number 1, block Number 01, area size 3 to read	P2P parameter Number 1, block Number 01, area size 3 to read saved.
N00057 – N00060	_P1B01R D4	Device structure	P2P parameter Number 1, block Number 01, area device 4 to read	P2P parameter Number 1, block Number 01, area device 4 to read saved.
N00061	_P1B01R S4	Word	P2P parameter Number 1, block Number 01, area size 4 to read	P2P parameter Number 1, block Number 01, area size 4 to read saved.
N00062 – N00065	_P1B01 WD1	Device structure	P2P parameter Number 1, block Number 01 saved, area device 1	P2P parameter Number 1, block Number 01 saved, area device 1 saved.

Number	Keyword	Type	Detail	Description
N00066	_P1B01 WS1	Word	P2P parameter Number 1, block Number 01 saved, area size 1	P2P parameter Number 1, block Number 01 saved, area size 1 saved.
N00067 – N00070	_P1B01 WD2	Device structure	P2P parameter Number 1, block Number 01 saved, area device 2	P2P parameter Number 1, block Number 01 saved, area device 2 saved.
N00071	_P1B01 WS2	Word	P2P parameter Number 1, block Number 01 saved, area size 2	P2P parameter Number 1, block Number 01 saved, area size 2 saved.
N00072 – N00075	_P1B01 WD3	Device structure	P2P parameter Number 1, block Number 01 saved, area device 3	P2P parameter Number 1, block Number 01 saved, area device 3 saved.

Table 50 – List of communication flags based on P2P service setting (4)

Number	Keyword	Type	Detail	Description
N00076	_P1B01 WS3	Word	P2P parameter Number 1, block Number 01 saved, area size 3	P2P parameter Number 1, block Number 01 saved, area size 3 saved.
N00077 – N00080	_P1B01 WD4	Device structure	P2P parameter Number 1, block Number 01 saved, area device 4	P2P parameter Number 1, block Number 01 saved, area device 4 saved.
N00081	_P1B01 WS4	Word	P2P parameter Number 1, block Number 01 saved, area size 4	P2P parameter Number 1, block Number 01 saved, area size 4 saved.

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10.2. List of communication relays (L)



ATTENTION

- If P2P parameters are to be specified with SoftMaster-NM used for N area, the setting is performed automatically. Its modification during Run is also available by P2P dedicated instruction.
 - Since the addresses of N area available are classified according to P2P parameter setting number and block index number, the area not used for P2P service can be used as an internal device.
-

10.3 ASCII code table

American National Standard Code for Information Interchange (ASCII).

Table 51 – ASCII table (1)

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
00	000	NULL	40	064	@	80	128	€	C0	192	À
01	001	SOH	41	065	A	81	129	ƒ	C1	193	Á
02	002	STX	42	066	B	82	130	,	C2	194	Â
03	003	ETX	43	067	C	83	131	ƒ	C3	195	Ã
04	004	EQT	44	068	D	84	132	„	C4	196	Ä
05	005	ENQ	45	069	E	85	133	…	C5	197	Å
06	006	ACK	46	070	F	86	134	†	C6	198	Æ
07	007	BEL	47	071	G	87	135	‡	C7	199	Ç
08	008	BS	48	072	H	88	136	^	C8	200	È
09	009	HT	49	073	I	89	137	%	C9	201	É
0A	010	LF	4A	074	J	8A	138	Š	CA	202	Ê
0B	011	VT	4B	075	K	8B	139	◁	CB	203	Ë
0C	012	FF	4C	076	L	8C	140	Œ	CC	204	Ì
0D	013	CR	4D	077	M	8D	141	ƒ	CD	205	Í
0E	014	SO	4E	078	N	8E	142	Ž	CE	206	Î
0F	015	SI	4F	079	O	8F	143	ƒ	CF	207	Ï
10	016	DLE	50	080	P	90	144	ƒ	D0	208	Ð
11	017	DC1	51	081	Q	91	145	‘	D1	209	Ñ

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10.3. ASCII code table

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
12	018	DC2	52	082	R	92	146	'	D2	210	Ò
13	019	DC3	53	083	S	93	147	“	D3	211	Ó
14	020	DC4	54	084	T	94	148	”	D4	212	Ô
15	021	NAK	55	085	U	95	149	•	D5	213	Õ
16	022	SYN	56	086	V	96	150	–	D6	214	Ö
17	023	ETB	57	087	W	97	151	–	D7	215	×
18	024	CAN	58	088	X	98	152	~	D8	216	Ø
19	025	EM	59	089	Y	99	153	™	D9	217	Ù
1A	026	SUB	5A	090	Z	9A	154	š	DA	218	Ú
1B	027	ESC	5B	091	[	9B	155	›	DB	219	Û

Table 52 – ASCII table (2)

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
1C	028	FS	5C	092	\	9C	156	œ	DC	220	Ü
1D	029	GS	5D	093	]	9D	157	□	DD	221	Ý
1E	030	RS	5E	094	^	9E	158	ž	DE	222	þ
1F	031	US	5F	095	_	9F	159	ÿ	DF	223	ß
20	032	(space)	60	096	`	A0	160		E0	224	à
21	033	!	61	097	a	A1	161	ı	E1	225	á
22	034	"	62	098	b	A2	162	ç	E2	226	â

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10.3. ASCII code table

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
23	035	#	63	099	c	A3	163	£	E3	227	ã
24	036	\$	64	100	d	A4	164	¤	E4	228	ä
25	037	%	65	101	e	A5	165	¥	E5	229	å
26	038	&	66	102	f	A6	166	¦	E9	230	æ
27	039	'	67	103	g	A7	167	§	EA	231	ç
28	040	(	68	104	h	A8	168	¨	EB	232	è
29	041	)	69	105	i	A9	169	©	EC	233	é
2A	042	*	6A	106	j	AA	170	ª	ED	234	ê
2B	043	+	6B	107	k	AB	171	«	EE	235	ë
2C	044	`	6C	108	l	AC	172	¬	EF	236	ì
2D	045	-	6D	109	m	AD	173		F0	237	í
2E	046	.	6E	110	n	AE	174	®	F1	238	î
2F	047	/	6F	111	o	AF	175	¯	F2	239	ï
30	048	0	70	112	p	B0	176	°	F3	240	ð
31	049	1	71	113	q	B1	177	±	F4	241	ñ
32	050	2	72	114	r	B2	178	²	F5	242	ò
33	051	3	73	115	s	B3	179	³	F6	243	ó
34	052	4	74	116	t	B4	180	´	F7	244	ô
35	053	5	75	117	u	B5	181	µ	F8	245	õ
36	054	6	76	118	v	B6	182	¶	F9	246	ö
37	055	7	77	119	w	B7	183	·	FA	247	÷

10. Appendix

10.3. ASCII code table

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
38	056	8	78	120	x	B8	184	,	FB	248	ø
39	057	9	79	121	y	B9	185	'	FC	249	ù
3A	058	:	7A	122	z	BA	186	°	FD	250	ú

Table 53 – ASCII table (3)

ASCII		Value	ASCII		Value	ASCII		Value	ASCII		Value
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
3B	059	;	7B	123	{	BB	187	»	FE	251	û
3C	060	<	7C	124	|	BC	188	$\frac{1}{2}$	FF	252	ü
3D	061	=	7D	125	}	BD	189	$\frac{3}{4}$	EF	253	ý
3E	062	>	7E	126	–	BE	190	¿	EF	254	þ
3F	063	?	7F	127	□	BF	191	À	EF	255	ÿ

10.4 Comparison table of Ethernet technology

Table 54 – Comparison of Ethernet technology

Technology		Speed (Mbps)	Transmission Media	Max. Distance
Token ring		4,16	UTP	100m
Ethernet	10BASE-T	10	UTP	100m
	10BASE-F (Multi Mode)	10	Optical cable	Max. 2km
	10BASE-F (Single Mode)	10	Optical cable	Max.2.5km
	10BASE-5	10	Coaxial cable	500m
	10BASE-2	10	Coaxial cable	185m
Fast Ethernet	100BASE-T4	100	UTP	100m
	100BASE-TX	100	UTP	100m
	100BASE-FX (Multi Mode)	100	Optical cable	412m(Half Duplex) 2km(Full Duplex)
	100BASE-FX (Single Mode)	100	Optical cable	20km
Gigabit Ethernet	1000BASE-T	1000	UTP	100m
	100BASE-FX (Single Mode)	1000	Optical cable	3km
	100BASE-FX (Multi Mode)	1000	Optical cable	500m
	100BASE-T	1000	Coaxial cable	25m
100VG-AnyLAN		100	UTP	-
ATM		155-622	UTP, Optical cable	-
FDDI (Single Mode)		100	Optical cable	40-60km
FDDI (Multi-Mode)		100	Optical cable	2km

10. Appendix

10.4. Comparison table of Ethernet technology

External dimensions

Unit: mm

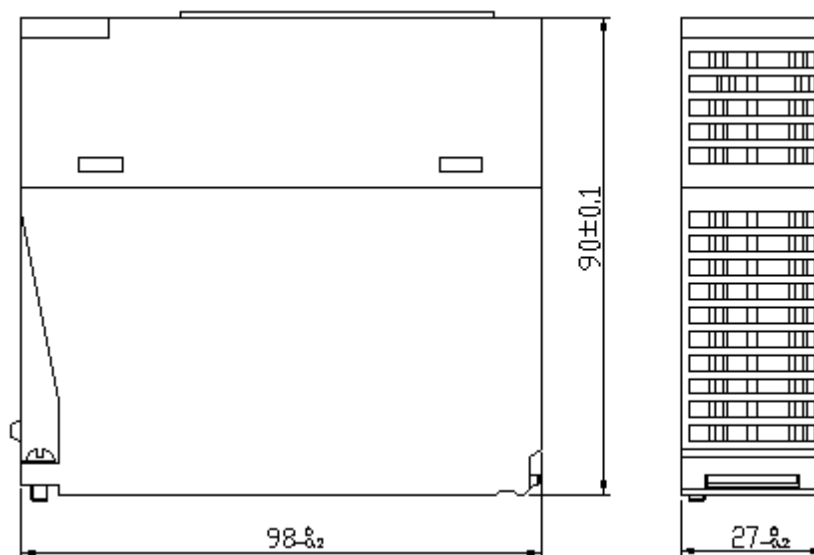


Figure 104 – External dimension of module

Honeywell

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